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TABLE OF CONTENTS

FOR

Vol. 60 No. 1

JANUARY, 1924

Whole No. 209

240-MM. HOWITZER AT OAHU.....	(Frontispiece)
COAST DEFENSE—LOGICAL AND VISIONARY.....	1
By COL. H. J. HATCH, C.A.C., AND CAPT. J. F. STILEY, C.A.C.	
EXTRACTS FROM THE ANNUAL REPORT OF THE CHIEF OF COAST ARTILLERY FOR 1923	22
MODIFICATION OF 240-MM. HOWITZER MOUNT TO SECURE ALL AROUND FIRE	31
By MAJ. W. A. JOHNSON, C.E.	
THE RESERVE OFFICERS' TRAINING CORPS AND DUTIES OF OFFICERS ON COLLEGE DUTY.....	38
By MAJ. L. R. WATROUS, C.A.C.	
PRINCIPLES OF WARFARE, BUSINESS AND ENGINEERING.....	47
By RALPH RAINSFORD.	
EDITORIAL:	
Annual Report of the Chief of Coast Artillery.....	57
Needs of Our Coast Defenses	62
COAST ARTILLERY BOARD NOTES.....	64
BULLETIN BOARD	72
PROFESSIONAL NOTES	81

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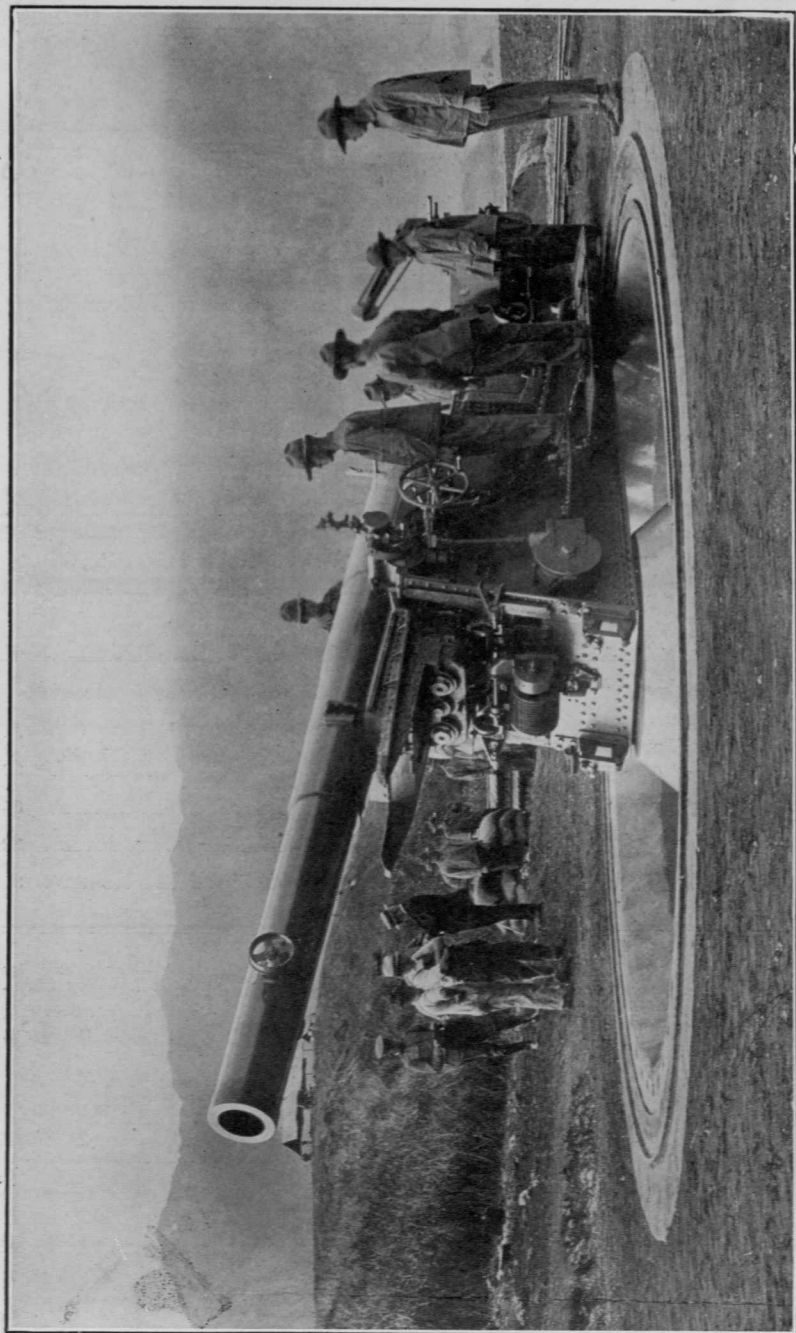
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240-MM. HOWITZER—MODIFIED FOR ALL AROUND FIRE—COAST DEFENSES OF OAHU. (SEE PAGE 31)

The Coast Artillery Journal

Vol. 60 No. 1

JANUARY, 1924

Whole No. 209

Coast Defense—Logical and Visionary

*By Colonel Henry J. Hatch, C.A.C., and Captain Joseph F. Stiley,
C.A.C., of the Coast Artillery Board*

PHOTOGRAPHS BY U. S. ARMY AIR SERVICE, 20TH PHOTO SECTION



DEFENSE against an enemy from overseas demands the closest cooperation between Navy, Air Service and Coast Artillery. It demands that these three components of our first line of defense receive their proper development, not the development of any one element at the expense of the others, but a carefully planned, coordinated development of all three. It is by the coordinated efforts of these three that an invader may be frustrated before he gains physical contact with our shores.

Propaganda which has appeared in service periodicals and the daily press lately may fail of its ostensible objective—air service development, if such development requires the support of some of the claims made. Ideas that the battleship is defunct, that war has gone entirely into the skies, that coast fortifications are worthless, and that armies of invasion with the necessary equipment, hereafter will be transported and maintained through the air, are extravaganzas today. The propagation of such ideas should be combated. The civilian populations of the Central Powers were starved into submission by battleships which all of the bombers, dirigibles and submarines produced by those powers in more than four years, could neither find nor destroy. Their armies were beaten by armies which were escorted across oceans by battleships. Some claims having for a background bombing exercises are based not upon facts but a distortion of them. They can withstand neither debate, the analysis of reason, nor the reflection of recent history. Surely, enough sound reasons founded upon facts and reasonable foresight can be advanced to obtain the sorely needed Air Service development. When money must be spent to increase turret gun elevations in order that our fleet may not meet the fate of Von Spee or Craddock, and to maintain seacoast fortifications designed to spare New York and Boston such raids as Scarborough and Hartlepoole, the fallacy

should not be inflicted upon the tax payer that the battleship and fort are no longer of value and that war now will be decided in the heavens immediately above the earth.

It is the purpose of this article to present the viewpoint of a Coast Artilleryman as to the conclusions which may be drawn from recent bombing exercises.

On September 4th, 1923, a group of Coast Artillery officers left Fort Monroe on two mine planters to observe the bombing of the obsolete battleships *Virginia* and *New Jersey* by the Army Air Service. The vicinity of Cape Hatteras was chosen for bombing exercises because deep water comes in nearer to the shore there than elsewhere along the Atlantic coast and because the Naval Limitations Treaty required the sinking of the ships in at least 50 fathoms of water.

The Air Service had established a temporary airdrome at Hatteras and had on hand for the bombing 50-600 lb, 20-1100 lb. and 23-2000 lb. demolition bombs. The charge of TNT in each bomb amounted roughly to 50 percent of the weight of the bomb. Each bomb had both a nose and a tail fuze with primer detonators having 1.2 seconds delay in the nose fuze and .05 seconds delay in the tail fuze. All fuzes could be dropped "safe" from 8000 feet altitude. The 600 lb. bombs cost about \$300. apiece, loaded; the 1100 lb. \$500. and the 2000 lb. \$950.

The planes used were Martin, night bombardment, short distance, bombers. Each of these carries a crew of three men, weighs six tons in flying condition and can carry 4800 lbs. useful load. They have a minimum sea level speed of 62 m.p.h., and a maximum speed in level flight of 99 m.p.h. They have 6.8 hours endurance at 10,000 feet and can climb to this altitude in about two hours. The planes designated to attack from 10,000 feet were equipped with superchargers which supply air to the motors at sea level density.

Each plane was to carry a 100 lb. bomb for sighting purposes. The times of departure for the various flights were to be given by the Assistant Chief of Air Service and attacks were to be made from column formation. Arrangements had been made to photograph all phases of the exercises. Airships D-3 and T-2, procured meteorological data up to 6000 feet and transmitted these data to the various flights.

Early on September 5th, a flotilla of five destroyers was stationed at regular intervals on the sixteen mile line from Hatteras to the battleships, for patrol and rescue purposes. A board of Coast Artillery, Air Service, Chemical Warfare and Ordnance Department

officers was on the Army Mine Planters *Henry* and *Schofield* stationed in the vicinity of the battleships. Army and Navy officers, Government officials, press representatives and others had arrived on the Army Transport *St. Mihiel* and were stationed near the mine planters.

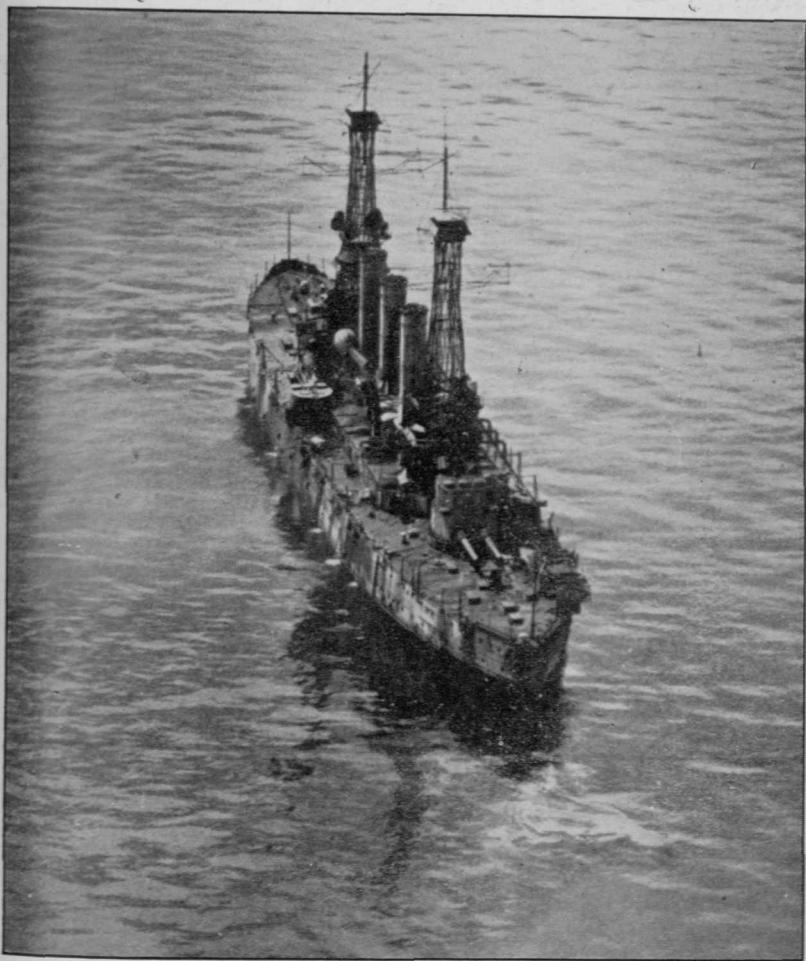


FIG. 1. A CLOSE VIEW OF THE EFFECT OF DIRECT HIT UPON NEW JERSEY BY 600 LB. BOMBS FROM 10,000 FEET

Four attacks were launched against the *New Jersey*. The first attack began at 8:52 a.m., and ended at 9:10 a.m. It was made by five planes from Langley Field which had encountered adverse weather conditions enroute. The weather conditions at the target were favorable for all attacks. Twenty 600 lb. bombs were dropped

during the first attack, from 10,000 feet altitude. The bombs could be seen from the instant they were released by the planes and followed easily by eye throughout their descent to the water. Stop watches gave the time of fall as a trifle less than 26 seconds. Two direct hits were made during this attack, neither of which caused any serious damage. One struck near the port forward 8-inch gun turret and may have detonated below the berth deck in view of the list to port which the *New Jersey* gradually took. The other struck on the starboard quarter and apparently detonated on impact as little evidence of this hit could be identified when the *New Jersey* was inspected at a distance of fifty to seventy-five feet, several hours later.

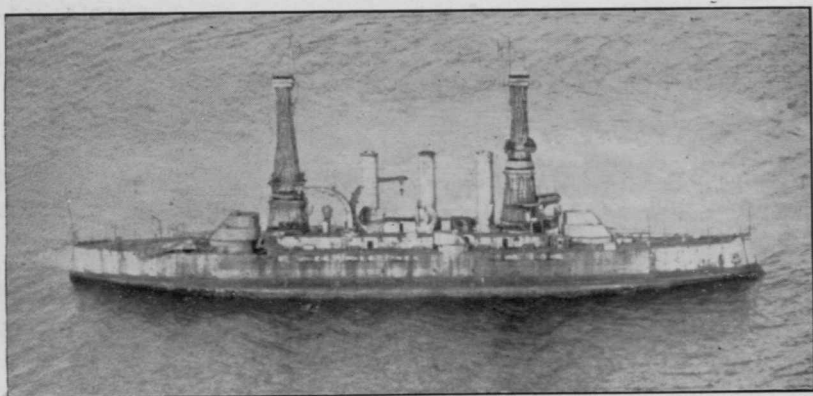


FIG. 2. THE NEW JERSEY SEVEN HOURS AFTER THE ATTACKS BEGAN

At 9:45 a.m., the *New Jersey* seemed to have a slight list to port. This may have been caused by explosions in the water near her hull, or, as noted above, may have been due to the hit near the port forward turret.

The second attack upon the *New Jersey* began at 9:57 a.m., and ended at 10:25 a.m. Seven 2000 lb. bombs were dropped from an altitude of 6000 feet by planes from the Hatteras airdrome. Four 600 lb. bombs were dropped from 10,000 feet by a belated arrival from Langley Field. No hits were made and none of the bombs appeared to fall near the vessel. The results from the 2000 lb. bombs is understood to have been due to a faulty releasing mechanism on the bomb racks. The bomb rack tripping mechanism is designed to operate on a thirty-five pound pull. When these were tested at the airdrome it was found that a pull of about one hundred pounds was required. Attempts to remedy this condition before the planes took off apparently were fruitless. One 2000 lb. bomb fell about two miles from the *New Jersey*.

For some reason at variance with the announced program the next attack was made upon the *Virginia*. This will be described later. At noon the *New Jersey* had an appreciable list to port but could have been trimmed, navigated and fought had she been manned.

In the third attack upon the *New Jersey*, seven 2000 lb. bombs were dropped from 3000 feet. The attack began at 2:18 p.m., and ended at 2:27 p.m. No hits were made. The second bomb dropped threw a column of water across the vessel and the scuppers ran full for several minutes after the splash. No damage was apparent; this bomb landed to starboard of the ship, which maintained the list to port for more than an hour afterward.



FIG. 3. THE NEW JERSEY, LISTING HEAVILY, MAINMAST FALLING

The fourth attack began at 3:25 p.m., and ended at 3:38 p.m. The flight consisted of two planes carrying two 1100 lb. bombs each. It is understood that the bombers were instructed to follow their own desires in choosing an altitude for bombing. One bomber chose 3000 feet, the other 4000. The third bomb dropped was released at 4000 feet. It struck the *New Jersey* on the starboard quarter and evidently detonated below the berth deck doing sufficient damage to cause the ship to roll over to port and go down stern first at 3:44 p.m., about six minutes after being struck and seven hours after the attacks upon this battleship began. The mainmast toppled just before the ship turned turtle.

Of the total of twenty-four 600 lb. bombs which were dropped from 10,000 feet, seventeen functioned satisfactorily; five were duds, and two were reported as having been dropped "safe." This is a large percentage of duds. Considering these, it was noticed that slight shocks were felt against the hull of the *Schofield* after the splash of bombs which were seen to leave the planes and then apparently fail

to explode after striking the water. It is possible that all of the bombs which were reported as duds actually were exploded by the nose fuze detonators which had a 1.2 seconds delay. An explosion

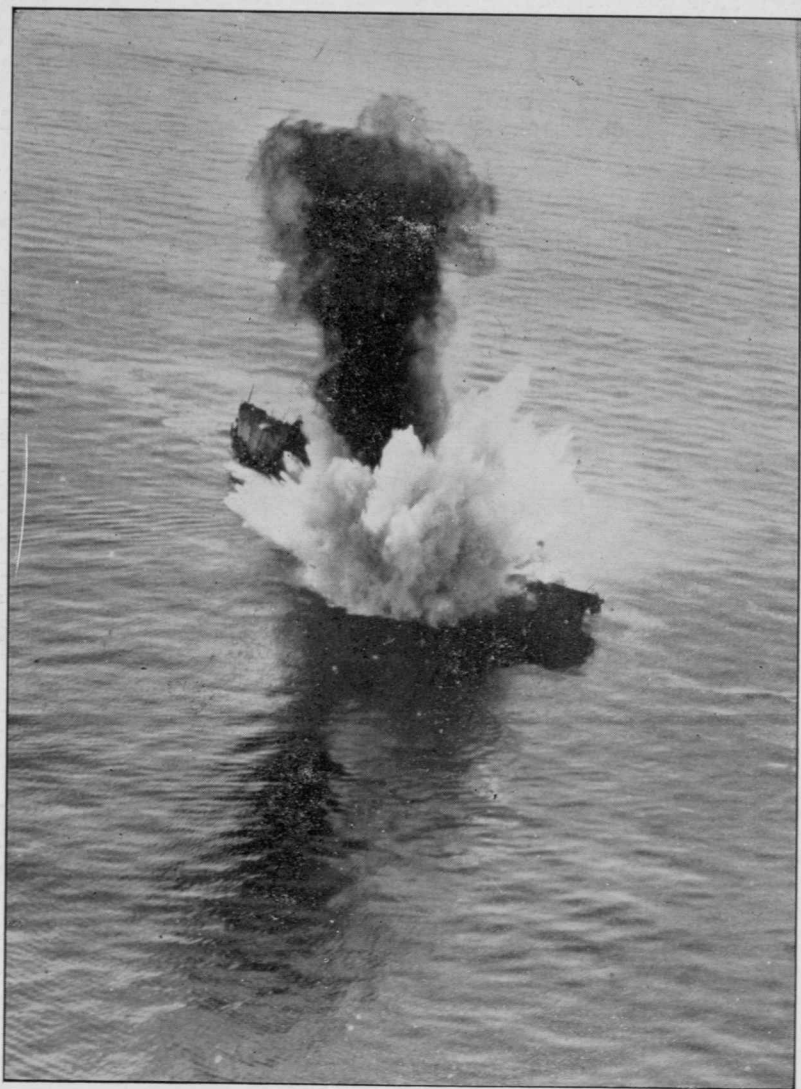


FIG. 4. THE FINAL HIT ON THE VIRGINIA. 1100 LB. BOMB DROPPED FROM 3000 FEET

conforming to such a detonator might occur at a considerable depth, and the effects of such an explosion be dissipated before the gas bubbles rose to the surface. At least one 600 lb. bomb explosion in the water near the bow of the *New Jersey* gave evidence of too great

water tamping. Whether this bomb was reported as a dud is not known.

The attack upon the *Virginia* was made from 3000 feet by seven planes, each carrying two 1100 lb. bombs. The time of fall of the bombs was fourteen seconds. The attack began at 11:55 a.m., and ended at 12:08 p.m. The fifth bomb dropped was a direct hit. It struck the *Virginia* on the starboard side near the fore and aft center line and about fifty feet abaft the mainmast. The effect of the explosion is well nigh indescribable. When the smoke lifted the *Virginia* was a shapeless wreck and sinking fast. Both masts and all three funnels practically were levelled. Daylight could be seen

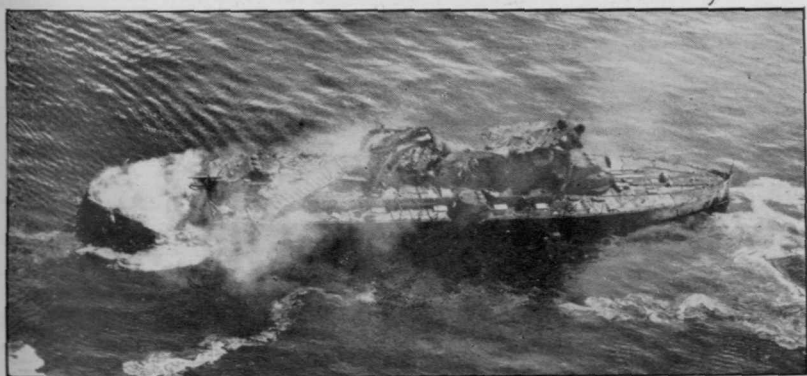


FIG. 5. A STUDY OF THE DAMAGE TO THE *VIRGINIA*

through the berth deck port holes aft, indicating that the bomb had penetrated beneath the wardroom and blown the quarter and half decks out of the ship. The effect radiated as far forward as the forward bridge which was a warped and twisted mass of metal. Had the ship been manned there would have been few, if any, conscious men aboard after the explosion. Another direct hit was made before the smoke lifted. At 12:22 p.m., eighteen minutes after being struck, the *Virginia* turned turtle to port and began to settle. The confined air burst the seams along her keel. At 12:24 p.m., the bow rose out of the water and the ship went down vertically, stern first.

Just before the *Virginia* went down, the observing vessels closed in to a hundred yards or so of the ship and, after she disappeared, passed through the eddies and floating bits of wreckage for a close-up view of the *New Jersey*. As noted above the *New Jersey* had a list to port, but had she been manned, could still have been fought and navigated.

As a preliminary to the attack upon the *Virginia*, the planes laid smoke screens between the observing vessels and this battleship. The screens were efficient and presumably "white phosphorus curtains." There was little or no wind.

The exercises throughout were interesting and highly spectacular. Considering as a preliminary the recent trip by bombing planes from Langley Field, Virginia, to Bangor, Maine, in eight flying hours, the Army Air Service contention, that under certain conditions they can sink any battleship that floats, is upheld. These exercises together with the sinking of the *Ostfriesland* and *Alabama* should have a deservedly beneficial effect politically upon Air Service development. None but a militant pacifist will deny that an enlarged and efficient Air Service is one of the essentials to national defense.

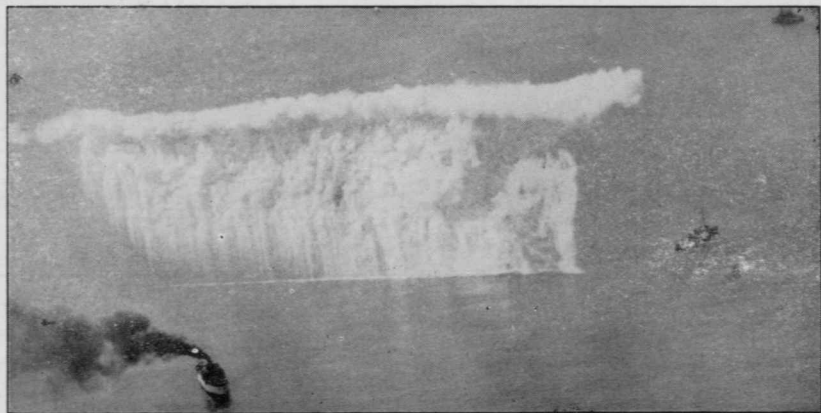


FIG. 6. SMOKE SCREEN BETWEEN THE ST. MIHIEL (BOTTOM) AND THE VIRGINIA (RIGHT CENTER).
THE NEW JERSEY AT UPPER RIGHT HAND CORNER

Considering the exercises from the viewpoint of a Coast Artilleryman, there was nothing to indicate that the day of the battleship has passed anymore than that the day of the railway locomotive as a means for transporting armies passed when the automobile was developed. The practically uninterrupted passage of two million American soldiers across seas, is too recent to forget. The Allied fleets still dominate the world's waterways. They are as powerful politically and strategically now, as they were when Allied and German airships and planes were bombing important targets. Who will say that the British or the German fleet was an unimportant target? True, the flying radius of bombing planes has increased to some extent, but the man-of-war has increased mobility also, and has increased offensive power in the development of the very weapon, the

bomber, or torpedo plane, which some persons now claim has driven the battleship from the seas. The submarine, bearing heavy cannon, has lost none of its power of concealment from either air or surface craft. Within the memory of living men the advent of the ironclad Merrimac, the rifled gun, the long range gun, the torpedo, submarine mine, torpedo boat, submarine, and now the bombing plane, have been heralded as marking the passing of the man-of-war. The man-of-war is still here however, swifter, more powerful, more dependable and yet more vulnerable than ever. There will be none living to recall the feat of the Wright Brothers when the man-of-war does pass into oblivion. War has not passed entirely into the sky, it merely



FIG. 7. 1100 LB. BOMB FROM 3000 FEET STRIKES THE U.S.S. VIRGINIA

has been extended into it. The final decision in war is still in the doughboy's hands at a beach cordon or line of trenches. All weapons, afloat, on land, or in the air, battleships, artillery, or planes are contributory to his progress.

Anyone who has seen the explosion of a submarine mine, a projectile, a "coyote" in rock during railway construction, or who has blown up a tree stump with a few sticks of dynamite, may visualize the effect of the detonation in the bowels of a ship, of a bomb containing from a quarter to a half ton of TNT. It does not require a vivid imagination to foresee that a hit by a 16-inch projectile or a submarine mine probably would put a battleship out of action. The devastation which can be wrought by the explosion in the vitals of a vessel of the new 10,000 lb. bomb, containing over two tons of TNT,

can be foreseen also. The danger of sympathetic detonation in a ship's magazines, from a hit such as was made upon the *Virginia*, would not be absent. Since the days of Tyre, the vulnerability of ships has been rediscovered frequently and with attendant hysteria.

The point to the last paragraph is—it was a foregone conclusion that these ships would sink, if they were hit in vital spots. That they would be hit was a certainty also, which was affected only by the number of bombs dropped and the altitudes chosen for the bombing. The marksmanship of the bombers, as recounted above, speaks for itself. Two hits were made upon the *New Jersey* from 10,000 feet altitude, by planes which flew 170 miles from Langley Field to the target—beyond the ranges of Coast Artillery cannon. This is the phase of the exercises which reflects most favorably upon the bomber, and the conclusion must be drawn, that the bomber is a weapon which may be used beyond the range of shore guns. In view of the conditions under which the bombing was carried out, conclusions as to the effectiveness of the bomber only can be surmised, because the target was immobile and defenseless. The facts should not be lost sight of that the warship is a weapon for use beyond the ranges of shore guns and beyond the ranges of the land-based bombers; that ships and bombers both can be used beyond the ranges of shore guns; and, that seacoast artillery, warships, and bombers, are weapons for use at ranges beyond reach of the beach cordon.

The claim, made so often lately, that the only defense against the bomber is by planes, is fallacious. The *best* defense against the bomber is a compound of planes, antiaircraft artillery and concealment. The best defenses for the bombers are planes and concealment. Control of the air was an ephemeral thing in France and in most cases was vested, at least temporarily, in the side which initiated a big movement. We have no assurance that an invader will be so lacking in pursuit planes and other aerial defenses at the moment of an attempted landing, that we can bomb him at will from any altitude.

The proposition that our present harbor defenses must be abandoned in view of their vulnerability to bombing attack has been argued with considerable vehemence. The proponents of this idea appear to argue around a stump in claiming on the one hand, that harbor defenses can be bombed with impunity, and on the other, that the fleet which launches bombers against us, can be bombed with impunity also. Such an assumption of conditions is illogical. Given a certain set of conditions, a battleship or a city can be destroyed by a parlor match. Surely fixed defenses are less vulnerable than the ships which will launch bombers. Has it been forgotten that the

Allies bombed the Zeebrugge floodgate for four years without success, and that the innumerable efforts of the Germans to wreck the sole floodgate at Dunkirk by aerial bombs were futile? Has it been forgotten that the battle cruiser *Goeben* was run aground to avoid sinking at Nagara, that she was repaired in a week and was cruising the Black Sea in a month, in spite of the 16 hits made out of an estimated 1000 bombs that were dropped at her while she was stranded in the Dardanelles? Very little military effect, other than a dampening of the morale of the civilian populations, was accomplished by all of the bombing in the World War. Helgoland, Gibraltar and the Dardanelles were unscathed when the war ended. What sane defensive plan could advocate the voluntary abandonment of such coast defenses? If it be any criterion, have we forgotten that fifteen years ago, wild eyed enthusiasts were claiming that cavalry was as "dead as a doornail" because the Wright Brothers finally had made a heavier-than-air-machine leave the ground? Fixed harbor defenses can not be abandoned safely until the visionary premise is established that armies no longer can be transported upon or beneath the seas, or, that an enemy ship, another gallant *Emden*, will be considerate enough to forego a bombardment of our seacoast cities until we have withdrawn from the vital "front" and assembled the planes and mobile artillery necessary to compel him to move a little farther offshore.

The harbor defenses of San Francisco, for example, are insurance against the ransom which can be demanded of that city by an enemy lying offshore, no less than the insurance afforded by planes, antiaircraft artillery and warships against the bombers of the same enemy fleet. While we are getting so overheated about control of the air which in surprise attacks at least, may rest with the offensive, let us not relinquish control of the surface and the depths of our harbor areas to an enemy armada. Control of the surface, whether sea or land or both, is the gage of success in war. The fixed gun is needed in a certain spot at a time, condition of visibility, and weather, chosen by the enemy, not by our own overzealous dreamers. One such gun at the critical moment is worth more than all of the railway and tractor artillery being rushed madly to the threatened point, and more than all of the bombing planes then in a repair shop or being groomed as carefully as racehorses at some distant landing field.

It is realized too infrequently in these days of economy, that the fixed gun and submarine mine are defensive weapons. They are attacked. They defend. Their offensive role lies chiefly in affording a secure base for the offensive-defense of the Navy. The mine

which is planted, with the proper tamping independently of nose or tail fuse detonators, is an instance of the target seeking the projectile, of an enemy surprise with reverse English.

A moment's thought should convince any man who writhes over his income tax return, of the inherent economy of seacoast artillery and the mine as a part of national insurance against aggression. Those coast defense batteries and other installations which resulted from the Endicott Board of 1886 *still stand*. The best, most costly battleships of the navies of the world at the time our mortar and gun batteries were built have passed from the stage, been scrapped or sunk. In their stead are more expensive ships, little if any less vulnerable to the fire of these same batteries than their prototypes. This cycle will be repeated. Even today a wholesale modification of the battleship is in progress. Bulges or blisters are being tacked onto the hulls as protection against underwater explosions. An armored upper deck, on which it is expected bombs may detonate or break before penetration, is being considered in connection with the loss of stability which such a deck might cause. The *New Jersey* and *Virginia* built in 1904 are on the ocean floor off Hatteras. Battery Anderson's four 12-inch mortars admittedly overmatched such vessels in their heyday. Battery Anderson, or its ilk, overmatched the modern *Colorado*, as the political brainstorm at the Dardanelles proved. The battleship commander who places his ship under the fire of a major caliber seacoast battery for a small part of seven hours is governed by considerations other than prudence. Any artillery battery commander worth his salt will guarantee to put out of action or destroy that ship very quickly. The initial cost of the *New Jersey*, the upkeep and maintenance costs of the ship for twenty years, and the costs of her successor, are an expensive but indispensable insurance premium; the cost of a balanced aerial fleet, with the cost of upkeep and the necessary frequent replacement of these comparatively fragile creations, is probably a more expensive, but equally indispensable premium. Either of these, is immensely more expensive than that premium paid in building and maintaining our seacoast fortifications: yet our cheapest insurance policy is being permitted to lapse, by abandonment to deterioration of some defenses, and by a dangerously alarming depletion of trained personnel in the remainder. With a weakened sea force defending the shores of two oceans, with an inadequate air force, and, with the harbingers of new wars in the press of today, this is the antithesis of economy. A reaction to a sane defensive plan is inevitable.

Too little weight is given by those who went "up in the air" in the controversy over the relative merits of the bomber and the bat-

fleship to a consideration of the probable visibility in action. No one is more aware of the vulnerability of a battleship than its commander. His chances for success, in any mission involving action against seacoast, have become more and more restricted due to modern inventions; more and more dependent upon surprise. Concealment is a dominant element of both surprise and security. The ship commander is constrained to choose that condition of visibility most favorable to his mission. Neglecting as problematical the contribution to concealment against planes offered by either lateral or vertical smoke screens, it is apparent that there is a considerable contribution to concealment afforded by fogs which infest much of our coastal waters for extended periods. A ship hidden in a fog is immune to bombing. It can navigate in comparative safety until the fog lifts, and can hear its enemy who can neither see nor hear it. A fog is one of the greatest hazards which the aviator encounters. He is lost while in it and probably is lost when he gets out. Surveillance in thick weather of the waters off our coasts is difficult and the detection of an enemy approach not at all certain; to argue otherwise betrays a lack of appreciation of the immensity of the oceans lapping our shores. Only the seacoast gun, by virtue of developments in subaqueous sound ranging, and the submarine mine, have any probability of hitting the mark in a fog.

On nights when moon and stars are hidden, a ship without lights is concealed as effectively as the proverbial needle. The task of locating a ship by aerial patrol is about as difficult as a search for the needle. Along shore there are many hours during the nights of a year in which such conditions of visibility exist. The pretty picture of ships in a trail of moonlight represents conditions as our dreamers would have them. An inky smear on canvas is the better picture. An all night search of a defensive sea area, by airplane flares, borders on futility. Even imagining that low powered searchlights can be operated from the air, this vertical light is less efficient than the lights of ground stations which can sweep the horizontal plane. A very effective search of the waters contiguous to seacoast fortifications can be made by the lights of harbor defenses. When a ship is some distance beyond the range at which it can be seen by observers ashore, there is enough diffused light from the beam to silhouette the target to an aerial or terrestrial observer who is located in the path of the beam and farther from the light than the ship. Instances are known in which enough light has been thrown upon a vessel to enable a person on deck to read a printed page, light which should enable an aerial observer on patrol to see the ship, yet the ship was not visible from land. The contribution to

illumination of targets by starshells from antiaircraft guns which can be diverted to such use is considerable.

The preceding is a concrete illustration of the manner in which the defensive missions of the Air Service and the Coast Artillery overlap and must supplement each other. Undoubtedly, the gun and the mine are the most efficient and most economical defense against ships within the ranges of visibility from terrestrial observing stations, say 20,000 yards. The claim for relative efficiency of the gun is made advisedly, for within these ranges very many accurately directed shells can be fired in the time which must elapse before bombers can climb out over the target, even assuming that we have control of the air. Guns can be kept in instant readiness. The time of flight of a coast artillery projectile is about 30 seconds at 20,000 yards. This is not to argue that bombers and observing planes should not be used within that range to augment and observe coast artillery fire. The cooperation of all arms is necessary in the common mission. Beyond the limits of terrestrial visibility and within the ranges of long range cannon, the relative efficiency of the gun and the bomber is not so discernible. Observing planes, however, must be available for fire control purposes until subaqueous sound ranging or some other dependable method, is developed for the longer ranges.

The probable situation beyond 20,000 or 25,000 yards is yet another instance of the cooperation necessary to accomplishment of the mission held jointly by the Coast Artillery and Air Service with the Navy; an organization in depth as the first line of defense of the nation. To a sailor the necessity for harbor defenses is not debatable. Even the hardest headed seaman recognizes in the plane another powerful ally (or enemy), and the necessity for equipping fleets with planes and antiaircraft guns likewise is evident. The security and mobility of fleets is dependent upon aerial *and* shore defenses. Our fast developing antiaircraft artillery must be recognized as contributing very materially to the missions of the warship and the plane.

The advent of the airplane as a war machine means that it will be utilized by both the attack and defense. It is certain that an overseas enemy will employ air forces to combat the air forces of the defense, to secure information of our dispositions, and to attack seacoast fortifications, defending naval craft and important military and commercial utilities. The defense must be prepared to oppose the enemy in the air as well as on the surface.

The air force of the defense, even if inferior to that of the attack, can give timely warning of the probable enemy objectives.

The antiaircraft defense, if developed to the normal of efficiency, can not be ignored by the attacker. The antiaircraft armament at least will force bombers to operate at altitudes at which the percentage of hits to be expected is small. The number of hours of continuous bombing necessary to destroy a single seacoast gun under the protection of antiaircraft armament probably would be much in excess of that required to sink an anchored and undefended battleship. The latter is a much larger and much more vulnerable target than the former. Bombing planes must operate either under cover of darkness or under the protection of a force of combat planes superior to that of the defense.

In view of the suggestion that has been made that neither battleships nor seacoast fortifications are necessary in the modern war equipment of a nation, it might be interesting to attempt to visualize the situation as it would develop in case one belligerent, in a sane and reasonable preparation, has provided a properly balanced war equipment while the other has placed practically its sole dependence on a superior air force.

First, let us assume that the United States has been persuaded to scrap its fighting ships and seacoast guns on the theory that the next war will be fought and decided in the air. However confident we may be of our own wisdom we must not overlook the possibility that the enemy may not adopt a similar policy for himself. He may insist on keeping his feet on the ground. Suppose he just comes blundering along with his antiquated ideas of warfare and launches his attack not only with airplanes, but with battleships, submarines and destroyers followed by transports (since he has no navy to fear), loaded with land forces and all the old time paraphernalia of war. He anticipates meeting a superior air force if it be given time to concentrate at the point of his attack. He therefore utilizes every advantage of the initiative and weather conditions to deliver a surprise attack. So far as the defense is concerned, everything is staked on the result of the battle in the air. An air victory is necessary for a successful defense but not for a successful attack.

Assume that the enemy arrives off Sandy Hook in one of the fogs so common in that vicinity at certain seasons of the year. It is conceivable that he would be able to open bombardment on New York City before his presence is discovered. With the protection given him by his antiaircraft armament, his maneuvering ability, and such assistance as weather conditions afford in the way of concealment and increased difficulty of air navigation, he would be able to continue his bombardment for several hours before a single bombing plane of the defense could climb to the altitude necessary to en-

gage one of his ships on equal terms with the antiaircraft defense. The naval commander approaches the harbor entrance with the knowledge that there are no subaqueous sound ranging equipment and listening devices to reveal his presence, no submarine mines nor defending submarines to hit him below the belt without warning, no high powered guns at Fort Hancock or Fort Tilden to deny him the privilege of taking a squadron of ships on through the Narrows to bombard the city at closer range if he so desires, where he may include in his demand for tribute, the requirement that all bombing planes shall be called off on penalty of further destructive bombardment. As his main fleet lies at the harbor entrance within a few thousand yards from the former powerful fortifications on either side, he congratulates himself that a complacent government has allowed such splendid armament to become junk. He realizes that were that armament still in serviceable condition and efficiently served it would be impossible for him to escape from his present position with a single ship.

He realizes that an attack upon the Coast Defenses of Southern New York or any of the fortified harbors of the United States, once the best protected of any in the world, would not have received an instant's consideration from his government had not the United States surrendered its land and naval defenses to place its sole dependence on a means of warfare which in all nations is regarded as an auxiliary—an important auxiliary but an auxiliary arm of the service nevertheless, just as the cavalry and artillery are auxiliary arms. If he elects to take the chance of subsequent losses from bombing operations of the defense in order to close on the city he may conduct a squadron of his ships into the inner harbor.

As his flagship passes through the Narrows he observes the infantry garrisons of Forts Hamilton and Wadsworth performing admirably the intricate maneuvers of squads right and squads left and he smiles at the idea of economy that must obtain in a government which refuses to utilize the most effective and at the same time the least costly means of harbor defense. He knows that the splendid armament has been removed and that ever since the World War these once powerful fortifications, which frown at him on both sides from a few hundreds of yards, have been garrisoned by infantry battalions instead of skilled Coast Artillery gunners. Before the World War these defenses would have been able to place 100 shots a minute on a target entering the Narrows. Now the frowning fortifications frown and the admiral smiles at his easy access to the inner harbor of one of the greatest cities in the world when, formerly, his chances of passing these same fortifications would have reminded him of the

chances of the celebrated celluloid dog chasing the asbestos cat through hell.

While his fighting planes probably are overmatched by those of the defense, the heavy bombers of the latter have not been able, as yet, to climb to one half the altitude necessary to attack him and already he has demanded that they be recalled. Assuming that such demand be refused he may lose one or more of the ships he has brought into the inner harbor, but in the meantime, landing operations at selected points may be carried out by the main fleet without cessation of fire. In order to bomb ships and landing parties, the air forces of the defense must provide not only a large number of bombing planes at every point of attack, but for each such point, a superiority of fighting planes also. If it required seven hours for twenty to thirty bombing planes to sink a defenseless anchored *New Jersey* with bombs dropped from 3000 to 4000 feet, it is illogical to count on the speedy destruction of a fleet of maneuvering men-of-war, each heavily armed against aircraft and mutually self supporting.

Landing parties, once having gained a foothold would not be inconvenienced greatly by bombers or by the feeble resistance a depleted land army could offer. They could organize soon a position from which it would be difficult to dislodge them. It is possible we would regret the brand of economy which prevented the installation and maintenance of the kind of defenses which history indicates positively would have made the penetration of an enemy squadron into one of our greatest harbors an impossibility.

If we as Americans are to exercise our imaginations in attempting to visualize the details of an attack upon us, it would be pleasanter to reverse the supposed methods of preparedness for war of the belligerents.

We would find it more satisfactory to assume that our measures of preparation were based on a real economy of forces. These measures should have included seacoast fortifications and heavy mobile guns, as the cheapest and most efficient insurance against enemy occupation of our harbors or open coasts. Our scheme of preparedness should have recognized that each arm of the service has its rightful missions; that in modern warfare the power which places its sole dependence on any one of them will be doomed to disaster and that final decision in war must come as a result of infantry combat to which all other arms are auxiliary.

The Navy is a principal component of the first line of defense against an overseas enemy. Its mission is to seek out the enemy navy and destroy it. If successful in gaining and holding command

of the sea, the war can not be brought to our shores. Separated as we are by oceans from powerful potential enemies, an efficient navy is an expensive but comfortable insurance, but it must not be our only investment in insurance against war. The navy's most important mission is an offensive one as the best means of defense. It must maneuver in masses large enough to defeat any enemy combination which can be brought against it. It must not be expected to remain in positions of defense along our coast lines where it can be taken in detail by a superior enemy force. Our coasts and harbors can be more economically defended by heavy guns and mines. An investment in fortifications amounting to less than the cost of providing and maintaining a single modern battleship would make any of our harbors so patently immune from direct naval attack that no enemy would invite their sustained fire. Naval battles are decisive, as a rule. The inferior navy will lose command of the sea, but an inferior navy, operating from securely fortified bases can make the transportation of troops to a hostile shore a hazardous undertaking. Our preparedness must include the navy, the air forces, the fixed seacoast armament, the fixed and mobile antiaircraft armament, the heavy mobile armament suitable for coast defense operations against naval craft attempting to support landings on our unfortified coast lines, and the mobile army with whom the decision must lie once an enemy has gained a foothold. We will have taken then the most effective measures to prevent a war being forced upon us. If we are strong enough our insurance is positive and the guarantee certain. If an enemy, fancying himself more modern than we, assumes that the next war will be fought in the air and fails to utilize the supposedly obsolete warships or field forces, he can not possibly gain a decision over us.

Imagine his supposed approach to our shores with vast fleets of airplane carriers, fighting planes, bombing planes, airships, and such other air contrivances as he may have devised, as the only protection or the main protection to transports bringing his army and war material. We must grant him sufficient sanity to realize that he can not bring his war on us to a favorable decision except by the eventual landing of a field army. We even may concede that he has not gone astray entirely on the matter of air power and that he has some semblance of a navy. Since his ultramodern doctrine conceives the supremacy of *air power über alles* this navy is perhaps a concession to those who view the future through the glasses of history and reasonable foresight instead of through the spectacles of hysteria.

He approaches Sandy Hook, let us grant, as secretly and successfully as did the more conventionally equipped predecessor whom we have visualized. To have done so he must have avoided or defeated our submarines and fast naval craft which, operating from fortified bases, follow his column for the purpose of sudden raids on any portion of his transport fleet that may be protected insufficiently at any time by war ships. It would have been impracticable for him to include troop ships in his train had not his naval forces first secured command of the sea by the destruction of our main fleet, or else on the assumption that the battleship fleets of both belligerents have been scrapped as result of treaty agreements prior to the war. However, we are dealing with an illogical enemy, so let us be illogical momentarily, forget our Navy somehow, and permit this overpowering brainstorm in the air to approach our coasts. (We must get them there or we can not finish this article).

In admitting the possibility of his successful voyage to hostile shores with an expedition composed of airplane carriers, troop ships, repair ships, transports for war material and the like, but without an escort overwhelmingly powerful compared with the sub-surface and fast surface craft of his opponent's regular or improvised naval forces, we are exceedingly generous in the estimate of the possibilities which favor our opponent in the imaginary conflict. Conceding the improbable, it is certain that when the fog lifts it must not find him closer than twenty miles to the harbor entrance, since we are now assuming that the long range guns and mortars of Forts Hancock and Tilden are in serviceable condition and efficiently manned.

The missions of the enemy air force will be, the defeat of the air forces of the defense, the silencing of the fixed and mobile batteries, and the destruction by bombing of important military and commercial utilities of New York City and vicinity. If vastly inferior, the fighting planes of the defense may decline a general engagement and remain under cover awaiting opportunity to concentrate in an attack on any division of enemy bombing planes whose escort of fighting planes is such that a successful attack appears possible.

The batteries of the defense are distributed widely and are difficult to locate accurately. This applies particularly to mobile batteries which may be concealed effectually. The enemy now must reckon with the powerful armament of Forts Wadsworth and Hamilton also. The infantry troops which garrisoned these stations made vacant after the World War by insufficient Coast Artillery personnel are displaced by expert gunners now.

Enemy success in occupying the harbor, or in effecting landings within range of its defenses, is predicated on the destruction of practically every battery of the defense and the clearing of the channel of submarine mines. Should he venture into the harbor or sufficiently near the beach to attempt a landing before all the batteries of the defense are out of action, the result will be disastrous for him. A single battery holding its fire until such a fleet as his has approached to close range, would create havoc with his ships before any number of aircraft could reduce it. Antiaircraft batteries are located at a distance from the seacoast batteries they defend and their fire would not reveal the locations of the latter. They will compel enemy bombing planes to operate at altitudes approximating 10,000 feet, altitudes to attain which requires time, superchargers, and endurance.

How long it would be before this suppositious enemy could feel assured that there was no serviceable armament left to spring a sudden surprise on his unarmored or lightly armored fleet, should he attempt to enter the harbor, or, how many ship loads of bombs would have been expended before such assurance would be warranted, can be estimated roughly from the bombing demonstrations which have been held against defenseless targets. A conservative estimate certainly would accord much longer life to a battery, even if inadequately concealed and only reasonably protected by antiaircraft fire, than was experienced by the undefended *Virginia* and *New Jersey* anchored off Cape Hatteras. Not days but weeks certainly must be consumed in the enterprise under average weather conditions. The enemy commander would have no means of knowing when his job was complete except through the hazardous experiment of attempting to draw the fire of the defense by pushing a sufficient number of his ships to attract it, into the normal zones of fire of the defense. In the meantime fresh mobile batteries would have reinforced the defense, an adequate field army would have been concentrated at the point of attack and the entire naval and air force of the nation could be assembled, not only for abundant protection against invasion but to insure that the ill-equipped attacking fleet should escape with none of its elements. The damage that such portion of the enemy air attack as may have been launched against the city itself could accomplish would be negligible compared with that of the naval bombardment by heavy ships previously considered, which the assumed lack of coast defenses made possible. The attacker, without superior naval strength and depending on air forces alone soon would find his way of retreat cut off by the battle fleets of the defender.

However optimistic the proponents of preparedness by means of air forces alone may be, they sooner or later will be forced to admit that other branches and arms of the military and naval service have their distinctive missions, and, that a well balanced military and naval strength is necessary. An enemy can not transport troops to our shores until his surface craft have undisputed command of the sea. He can not enter our harbors nor approach our coasts in landing operations against big gun coast defenses. If he should succeed so far as to get a foothold on the beach, he must be in sufficient force from the outset to defend himself against the land forces which will close in upon him. His lines of communications with his base must be kept open. His transports must be able to augment his army of invasion at a rate superior to that at which all the land and water transportation facilities of the invaded country can deliver reinforcements to the army which will intrench around him rapidly. The air forces in any war now conceivable will have important missions but they can not do it all and it is to be hoped that intelligent enthusiasm for the development of a powerful Air Service will not weaken the case by grossly exaggerated claims.

"While not professional soldiers, men of the National Guard and Reserves are prompted to service by a patriotic devotion to the high conception of citizenship. Of all our citizens, they deserve praise for the energy that leads them to spend months and often years in readiness. These are the men you are to counsel, instruct, and guide. Your ideals of national obligation and your standards of efficiency are likely to be theirs. To insure the success of our military policy, the officers of the regular establishment must rise to a full appreciation of their new responsibilities and must bring to the task enthusiastic effort and efficient leadership."—General Pershing to the Graduating Class, Army War College, 1923.

Extracts from the Annual Report of the Chief of Coast Artillery for 1923

PERSONNEL

COMMISSIONED OFFICERS

The following table shows the assignment of commissioned officers, Coast Artillery Corps, on July 1, 1923:

WITH COAST ARTILLERY

Coast Artillery Organizations	603
(Includes 11 P.S. and 1 Inf. off.)	
Coast Artillery School and C.A. Board	53
Office Chief of Coast Artillery	13
Organized Reserves	58
Student—Special courses	7
	<hr/> 734

DETACHED OFFICERS LIST

General Service Schools	19
U. S. M. A.	32
R. O. T. C.	47
National Guard	38
Miscellaneous	34
	<hr/> 170

WITH OTHER BRANCHES

General Staff	25
Inspector Gen. Dept.	7
Ordnance Dept.	6
Signal Corps	10
Adj. Gen. Dept.	2
Finance	1
Air Service	2
	<hr/> 53

Total	957
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SUMMARY

With Coast Artillery	734
Detached Officers	170
With Other Branches	53
	<u>957</u>

The present authorized commissioned strength of the Coast Artillery Corps is 995. Since officers on duty with branches having permanent personnel are considered as belonging to those branches, the available commissioned strength of the Coast Artillery Corps is 936. There is, therefore, a shortage of 59 officers at the present time. This entire shortage is in the grades of captain and lieutenant.

COAST ARTILLERY OFFICERS RESERVE CORPS

During the past fiscal year the number of officers in the Coast Artillery Officers Reserve Corps has increased from 2,637 to 3,292.

The following table shows the gains and losses that have occurred and the present strength:

	Comm. July, 1, 1922	Gains				Losses					Comm. June 30, 1923
		R.O. T.C.	Trans- fers	Others	Total	Re- signed	Dis- charged	Died	Trans- ferred	Total	
Colonel.....	6		2	12	14			1		1	19
Lt. Colonel.....	10		1	19	20						30
Major.....	125		5	28	33	1		1	8	10	148
Captain.....	337		24	74	98	2	4	1	19	26	409
1st Lieutenant.....	401		19	104	123	5	6		12	23	501
2nd Lieutenant.....	1758	291	29	156	476	12	20	3	14	49	2185
Total.....	2637	291	80	393	764	20	30	6	53	109	3292

The following table shows the assignment status of all officers of the Coast Artillery Reserve Corps on June 30, 1923.

Corps Area or Department.....	1	2	3	4	5	6	7	8	9	Panama	Hawaii	P. I.	China	Total
General Assignment Group.....			1	1										2
Branch Assignment Group In Regular Army.....	16	17	18	5	2	3		5	20					86
Others.....		1	1					1						3
Territorial Assignment Group Assigned to Reserve Units.....	364	479	351	375	168	215	195	138	238					2523
In National Guard.....	109	31	56	10		9	11	27						253
Unassigned.....	29	28	37	14	19	73	95	8	97	13	8	2	2	425
Total.....	518	556	464	405	189	300	301	151	383	13	8	2	2	3292

ARMY MINE PLANTER SERVICE

In conformity with the Act of June 30, 1922, the number of Warrant Officers, Army Mine Planter Service, was reduced to 40 on August 29, 1922, by the discharge of 32 Warrant Officers. An effort was made at the last session of Congress to secure a modification of the act, referred to above, so that it would be possible for these men to be retired or to remain in the service until absorbed. This effort was not successful. During the past fiscal year two of these men have been reappointed Warrant Officers, Army Mine Planter Service, to fill vacancies and other reappointments will be made as vacancies occur.

NON-COMMISSIONED STAFF OFFICERS, COAST ARTILLERY CORPS

In compliance with Circular No. 275, War Department, 1921, as amended, all surplus non-commissioned staff officers, Coast Artillery Corps, were demoted on March 31, 1923. The following table shows the status of non-commissioned staff officers, Coast Artillery Corps, on June 30, 1923.

	Fleet	Radio	Clerical	Artillery	Supply	Band	Total
Master Sergeants.....	48	0	24	10	1	0	83
Technical Sergeants.....	84	0	0	0	0	0	84
Staff Sergeants.....	94	33	62	24	4	13	230

The increasing importance of radio communication in the Coast Artillery Corps has made it advisable to provide for the promotion of non-commissioned officers of this class from staff sergeant to technical sergeant and then to master sergeant. Examinations are now being held and these promotions will be made as vacancies occur after September 1, 1923.

ENLISTED STRENGTH

The authorized enlisted strength of the Coast Artillery Corps during the year ending June 30, 1923, has been 12,026. The distribution of this strength on June 30, 1923, is shown in the following table:

Office, Chief of Coast Artillery	8
Fixed Defenses in the United States	3406
Coast Artillery School	200
Antiaircraft Artillery	1325
Heavy Tractor Artillery	422
Railway Artillery	595
Sound Ranging Company	70
Foreign Garrisons	6000 (a)
Total	12026

(a) Includes one battalion of railway artillery, one antiaircraft regiment, and one regiment 155-mm G.P.Fs. in the Hawaiian Department; one antiaircraft battalion and one regiment 155 G.P. Fs., less two battalions, in the Philippine Department. Does not include 1600 Philippine scouts Coast Artillery now authorized in the Philippine Department.

The only material change made in this distribution since my last report has been caused by sending the 60th Artillery Battalion (A.A.) from the Coast Defenses of Galveston to the Philippine Department.

It will be noted from the above table that practically 50 per cent of the enlisted strength of the Coast Artillery Corps is now allotted to our foreign garrisons. This fact, coupled with the existing method of furnishing replacements to foreign garrisons, and the apparent difficulty experienced in keeping Coast Artillery Corps organizations recruited to full authorized strength, results in very great dissatisfaction among the non-commissioned officers of units stationed in the Continental United States from which replacements for the foreign garrisons are furnished. It further results in a constantly shifting personnel in such units, and in a constant shortage in that personnel. To illustrate the last mentioned condition, it might be stated that, at last reports, the Coast Defenses of Puget Sound, with an allotted strength of 375, had a total strength, present and absent, of 225. These conditions make most difficult, the accomplishment of any satisfactory training and materially lower the morale of the commands affected.

There are three methods of improving these conditions, viz:

(a) Stimulating recruiting or increasing the assignment of recruits to Coast Artillery Corps units so as to keep them filled to their authorized strength.

(b) Devising a different method of furnishing replacements to foreign garrisons, based on replacement by organization, rather than by individuals. Much thought has been given this subject by officers on duty in this office, but no satisfactory solution of the problem has yet been forthcoming.

(c) An increase in the allotted strength of the Coast Artillery Corps which will give a larger proportion of the whole strength to the home garrisons.

In this latter connection, while I fully appreciate the conditions which have resulted in the present distribution of the 125,000 strength of the Regular Army, under which distribution the Coast Artillery Corps is allotted a strength of 12,026 enlisted men, I feel it my duty again to invite attention, in this report, to the following

facts which have heretofore been reported, and recommendations, which have heretofore been made, by me.

The present allotted strength of the Coast Artillery Corps is less than it has been at any time since 1901, although the present strength of the Regular Army is greater than it has been at any time during that period except during and immediately after the World War.

Attention has heretofore been invited to the great necessity for an increased number of Coast Artillerymen for duty in the Panama Canal Department, but it was found impossible to furnish the same either by reducing the present allotment of Coast Artillerymen to other activities or by increasing the general allotment of strength to the Coast Artillery Corps.

The present allotment of strength to Coast Artillery commands within the Continental United States—other than the Coast Defenses—are as follows:

Antiaircraft Artillery (1 regiment and 2 battalions)	1325
Heavy Tractor Artillery (1 regiment, less 2 battalions)	422
Railway Artillery (one regiment, less 1 battalion)	595
Sound Ranging (1 company)	70

The strengths allotted to the above activities are the absolute minimum which, in my opinion, will permit the prosecution of the necessary development work with anything approaching a reasonable degree of training of the organizations themselves, and the essential training facilities for the Coast Artillery of these classes in the National Guard and Organized Reserves.

The balance of the Coast Artillery Corps strength, which is available for allotment to the Coast Defenses, has been distributed as follows:

Portland	124	Cape Fear	16
Portsmouth	16	Charleston	16
Boston	265	Savannah	16
New Bedford	12	Key West	16
Narragansett Bay	260	Pensacola	100
Long Island Sound	500	Mobile	16
Eastern New York	46	Galveston	25
Southern New York	32	San Diego	25
Sandy Hook	380	Los Angeles	240
Delaware	32	San Francisco	380
The Potomac	12	Columbia	25
Baltimore	12	Puget Sound	375
Chesapeake Bay	440		
Total			3381

It will be noted that in the above table there are enumerated 25 Coast Defense Commands, 15 of which are supplied only with caretaking detachments of from 12 to 32 men, leaving but 10, which are supplied with a sufficient number of enlisted men to carry on any semblance of training. Of the 15 Coast Defense commands which are in the hands of caretaking detachments, the War Department has decided to abandon 5. It is uncertain when this abandonment will be accomplished, thus making the personnel allotted to them available for allotment elsewhere, but, in any event, there will be a saving by this means of but 86 enlisted men. Of the 10 Coast Defense commands not in the hands of caretaking detachments, none are supplied with anything like sufficient personnel to man the important armament in case of emergency. In fact, in making these allotments, all idea of basing them upon strategic or tactical considerations had to be abandoned, and the allotments made purely with a view to facility of training and economy of supply.

I feel it my duty to urge strongly that careful attention be given to this condition, which leaves many of our fortified harbors practically without any protection whatever, and none of them—even the most important—with anything like an adequate protection in emergency.

I have heretofore set forth my views as to the minimum strength which should be allotted to the Coast Artillery Corps to supply adequate protection of our fortified harbors in emergency and reasonable facilities for training the Coast Artillery of all three categories of the Army of the United States. This minimum involves an increase in the enlisted strength allotted to the Coast Artillery Corps of 9,797, bringing the total strength of the Corps to 21,823, the increase to be apportioned as follows:

For the Fixed Defenses in the United States	6,691
For Railway and Heavy Tractor Artillery	2,706
For the Panama Canal Department	400
Total	9,797

This would permit allotments to Coast Defense Commands in the United States as follows:

Portland	650	Charleston	125
Portsmouth	125	Key West	275
Boston	850	Pensacola	285
New Bedford	125	Galveston	285
Narragansett Bay	650	San Diego	285
Long Island Sound	1250	Los Angeles	285
Southern New York	650	San Francisco	1250
Sandy Hook	650	Columbia	285
Chesapeake Bay	750	Puget Sound	1250

It would also permit the increase of the present very inadequate railway and heavy tractor artillery units to two regiments of each, and the much needed increase of 400 men for the Panama Canal Department.

The importance of this matter is such, and the necessity for the increase recommended, so great, that I feel impelled to urge, if it cannot be accomplished in any other way, that it be secured through Congressional action in the form of an increase in the authorized strength of the Regular Army for allotment to the Coast Artillery Corps.

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TRAINING

During the academic year 1922-23, Coast Artillery Units of the Reserve Officers' Training Corps have been conducted in nineteen (19) institutions. The total enrollment was 4,673. There were on duty with these units forty-four (44) commissioned officers, four (4), non-commissioned staff officers and fifty-three (53) other enlisted men. The courses, as conducted, were in general satisfactory, but it is contemplated issuing a more standardized program in order to obtain a greater degree of coordination of the work in all units. The unit has been withdrawn from the University of Columbia as it was found that this unit was nonproductive and not up to the standard.

Coast Artillery Reserve Officers' Training Corps Camps were held at Fort Monroe, Virginia; Fort H. G. Wright, N. Y.; Fort Casey, Washington; and Fort Barrancas, Florida. It is estimated that approximately 550 students attended these various camps. The restriction on numbers attending, due to the limited amount of funds available for transportation, has practically eliminated the attendance at these camps of basic students in the Fifth, Sixth and Seventh Corps Areas.

The Army Correspondence Courses for officers of the Organized Reserves have been pursued by 702 Coast Artillery Officers during the year. This work is still handicapped by the lack of available texts. Many documents issued by the several branches of the War Department are exhausted, and due to the limited funds available, the training regulations which were to have replaced these documents have not yet been printed. It is hoped that proper texts will be available for this course during the next school year.

MATERIEL

2-16" guns are now being mounted for the protection of New York harbor and 4-16" howitzers for the protection of the entrance to Chesapeake Bay. The installation of the fire control equipment

for this armament has been started but this work has not progressed as rapidly as desirable due to the limited appropriations which could be secured for this purpose. It will not be practicable to provide more than a very simple fire control system for these batteries by the end of this fiscal year. Extensions thereto must be postponed until additional funds become available.

Development work on Ordnance fire control equipment for this 16" armament has continued throughout the year. Special plotting devices, designed to replace the plotting board, have been tested, but none were found of sufficient merit to warrant their adoption. Development work on instruments of this kind must be continued. A universal deflection board, which can be used with any type of major caliber guns, is now under construction.

Work in connection with the construction of 4 mounts for 14" 50 caliber railway guns was continued. One of these mounts has been tested at Aberdeen Proving Ground and is now undergoing slight modifications.

The Cloke Plotting and Relocating Board, now under manufacture, and the Universal deflection board are two important items of fire control equipment for railway artillery organizations. It is expected that a number of the plotting boards will be made available for issue during the coming fiscal year.

During the past year considerable progress has been made in the development of a non-draggable mine. Construction of one of these mines for service test during this fiscal year is contemplated. The advantage which this type of mine has over the present type is that the mine is held on the bottom with the anchor until a few seconds before it is to be fired. It is believed that this development will offer a solution of the most difficult problem now connected with the submarine mine defense of certain harbors where deep water and swift currents are encountered.

There are four new types of antiaircraft guns now in process of development. The first of the new guns is the 50 caliber machine gun with a horizontal range of about 27,000 feet, a straight up range of 9,000 to 12,000 feet and a rate of fire of about 800 shots a minute. Fire control is to be maintained with this gun through new tracer ammunition, visible by night up to 7,500 ft. and by day up to 6,000 ft. The 50 caliber gun is under manufacture for issue as substitute for the 30 caliber weapon, now used, which latter is a relic of war days.

The second gun under development is a 37-mm. machine gun, firing high explosive shells with fuses so delicately adjusted that the shells, while safe to handle before firing, explode on contact with balloon fabric once they have been discharged from the gun. A

rate of fire of 100 to 120 shots a minute is expected with this weapon as is also a straight up range of about 14,000 feet and tracer ammunition visible up to 10,000 feet, making possible accurate firing up to that point. It is planned to install these weapons in batteries of four operating with a single telescopic sight control and to be trained and fired by a single gunner.

The third new gun in the group is a 3-inch weapon on a mobile mount with a rate of fire of fifteen shots a minute, effective at altitudes up to 21,000 feet, and with full 360-degree traverse to enable the gunner to follow his target in any direction. It can be fired at an elevation of 80 degrees and has a horizontal range of more than 38,000 feet with projectiles weighing 15 pounds and containing a heavy bursting charge. Guns and mounts of this type are now under test at army proving grounds.

Gun No. 4 in the anti-aircraft list is the 4.7 inch, firing a 45 pound shell to an effective altitude of about 30,000 feet. It is to be mounted on a mobile carriage with full traverse and equipped for power loading and with an automatic breech block to speed up firing. This gun also can be fired at an elevation of 80 degrees or within ten degrees of straight over the gunner's head.

As a supplement to these new weapons, the experts are working out a system of indirect aiming, experiments having shown that central control firing is greatly superior to the old wartime systems. Two types of central stations are under development, either of which will obviate the necessity for altimeter stations and baseline readings and materially speed up aiming and firing, although requiring less personnel in operation than the old control method.

* * * * *

The estimated cost of completing the fire control installations for modern batteries in the United States, the construction of which batteries is now practically completed, is \$841,787.43. Practically all of this amount is required for installations in connection with 12-inch long range guns, and 16-inch guns or howitzers. Very little work is contemplated in connection with short range armament of the older types. In addition to the above figure, (\$841,787.43) required to actually provide fire control systems for existing batteries, an annual appropriation of approximately \$60,000, is necessary to carry on needed development and for manufacturing modern fire control instruments.

* * * * *

Very respectfully,

F. W. COE,

Major General, United States Army.

To the Secretary of War.

Chief of Coast Artillery.

Modification of 240-mm. Howitzer Mount to Secure All Around Fire

By Maj. W. A. Johnson, C. E.

Editor's Note.—The following article gives in detail the modification of the 240-mm howitzer mount to secure all around fire. This work has been carried on under the direction of Major Johnson in his capacity as Department Engineer for the Hawaiian Department. As the solution of the problem in the Hawaiian Department may have a more general application in the modification of these howitzers for other localities, it is thought that the publication of this article will be of value to the entire Coast Artillery Corps.

On September 14, 1923, the Hawaiian Department conducted proof firing on an experimental mount designed for the purpose of securing all around fire with the 240-mm. howitzer, 1918 model (Schneider.)

The howitzer is designed as a portable unit. For transportation it is divided into four loads, viz: howitzer, cradle, top carriage and platform. When placed for firing the wheels are removed and the carriage is erected on the structural steel platform which rests on the ground. The platform has a large trunk-shaped portion which is embedded in the ground to absorb the reaction while firing and to furnish a well into which the breech of the gun can drop during recoil at high angle fire. The top carriage is pivoted at the front on a pintle seat which is supported by Belleville springs in a pintle socket attached to the platform. On top of the platform is a pintle socket plate which has two machined surfaces to which the pressure is transmitted from the two steel flasks, or sides, of the top carriage. Traversing is facilitated by the Belleville spring which provides a clearance of .02 to .08 of an inch between the top carriage and the platform except when firing. When the gun is fired the spring is compressed and pressures are transmitted through the large machined surfaces described above.

The trail carries two rollers provided with Belleville springs. When the gun is fired the springs are compressed and the pressures are transmitted to the platform through the flat surfaces of the trail. At each roller there is a clamp which bears down on a clamp rail, acts as a brake and holds the gun at the position set.

Since the traverse of the howitzer on its normal platform is limited to twenty degrees, its value as a unit of the fortifications of Oahu is practically nil, the problem in Oahu being to attack ships,

transports and landing parties distributed over extensive water areas. It became necessary, therefore, to devise some means whereby the arc of fire could be greatly increased. This really meant a revision of the mount to secure all around fire and a design to this end was prepared by the Department Engineer.

The general conditions covering the design are as follows:

(a) The structural steel platform must be wholly or in part discarded and replaced by one permitting rotation of the gun through an arc of 360 degrees, must provide a well for the recoil of

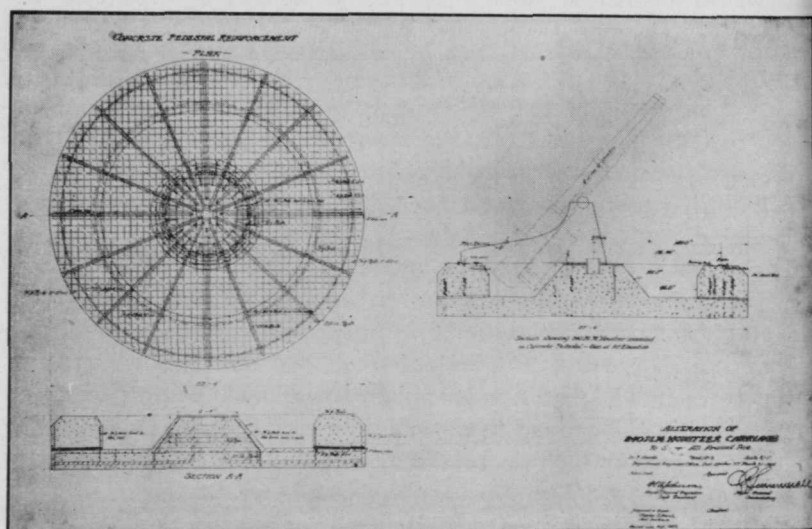


FIG. 1

the gun in any position and a support for the roller path assembly and traversing track.

(b) The principle of the Belleville spring and the transmission of the forces to the platform must be retained essentially as in the original mounting.

(c) Alterations in the carriage must be reduced to a minimum to avoid excessive cost and to permit the restoration of the carriage to its original condition, if necessary at any time.

(d) Expensive materials and shop work must be avoided on account of the necessity of keeping down the cost.

(e) The platform must have the structural strength to withstand the stresses to which it will be submitted and to maintain the normal accuracy of fire.

(f) The traversing mechanism must be extended to include 360 degrees of arc.

To meet these conditions a circular concrete gun block has been designed having a diameter of 23 feet 4 inches and a total thickness of 4 feet. To provide for recoil in all positions an annular shaped depression, two and one-half feet in depth, is provided. The outer wall of this depression is so shaped as to allow clearance for the breech of the gun in its rotation on the trunnions. The inner wall has the slope of the gun when at the maximum elevation permitted by the design. There is a center pedestal having a diameter of four and one-half feet at the top and eight and one-quarter feet at the bottom

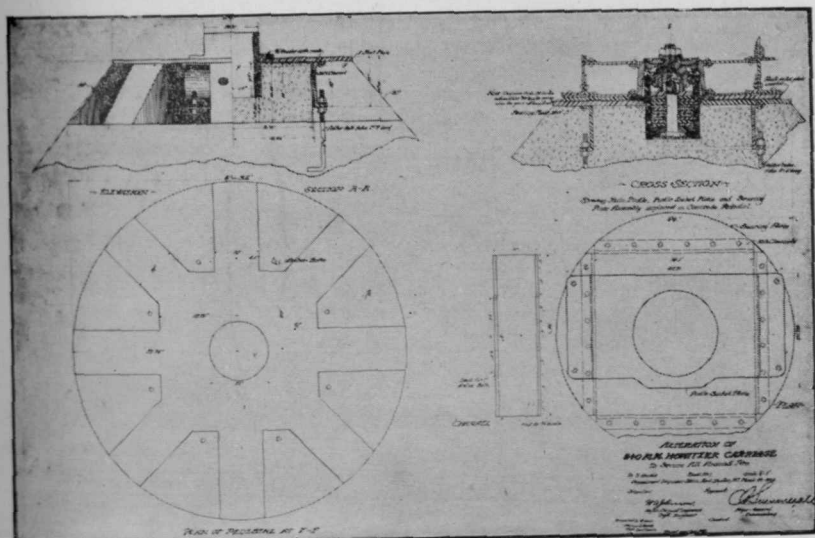


FIG. 2

which is the main support and transmits the principal stresses. The outer concrete ring provides a support for the roller path and the traversing rack. This gun block is substituted for the structural steel platform of the original mounting, which platform is discarded except for the pintle socket assembly and the pintle socket plate which are necessarily utilized.

To secure a bearing surface for the top of the pedestal there is provided a circular steel plate four and one-half feet in diameter and one inch thick. In the center of this plate is riveted the pintle socket assembly. Anchorage for this plate is secured by four 8-inch channels, one flange of each being riveted to the plate to form a square. Through the lower flanges of these channels pass eight anchor bolts with nuts above and below the channel flanges for leveling purposes. The pintle socket plate is removed from the original platform and is riveted upside down, to secure the benefit of the two machined sur-

faces, to the top carriage. It will be seen that this arrangement maintains a clearance of .02 to .08 of an inch between the top carriage and the platform and that the Belleville springs act exactly as in the original mount.

The bearing plate must be of sufficient diameter to take the pressure directly under the trunnions. The diameter of this plate is necessarily so great, in the longitudinal direction of the gun, as to prevent the elevation to its maximum, although an elevation of approximately fifty degrees may be obtained. The maximum range is secured by an elevation of about 43 degrees so that a portion of the plunging fire elevations only are sacrificed.

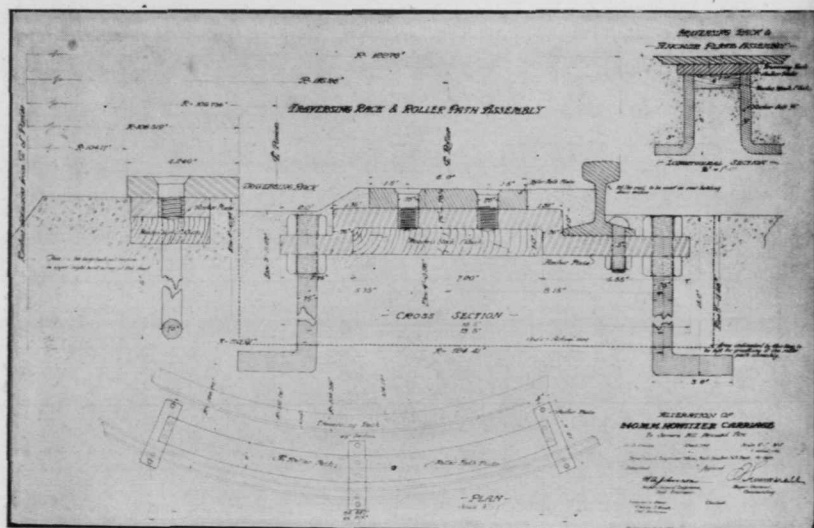


FIG. 3

The roller path and the clamp rail assembly consist of three inverted 25-pound rails for the roller path and one upright 25-pound rail for the clamp rail, bent to take the proper curvature, securely bolted together and anchored into the concrete by bolts fitted with leveling nuts. Rails were used for this assembly for the sake of accuracy, as the rails were on hand. It was found, however, that the amount of labor involved in bending them and in correcting irregularities of the roller surface is not justified. Consequently, this portion of the design has been revised for future construction. The new design employs a plain three-quarter inch plate, six inches in width, assembled in eight sections and supported on steel plates, or chairs, securely anchored in the concrete. The clamp rail will be as before and will rest on the chairs which support the roller path.

The adaptation of the traversing mechanism consists simply in placing a sufficient number of sectors of the traversing rack, end to end, so as to form a circle concentric with the roller path and at the proper distance therefrom to mesh with the pinion gear of the traversing mechanism. The rack sectors are screwed down to steel plates set in the concrete.

The concrete gun block is reinforced with steel rods and 25-pound steel rails. The most important feature of the reinforcing is the use of sixteen rails which radiate from near the center to the outer edge of the foundation slab. Eight of these rails are bent upward and extend nearly to the top of the pedestal surrounding the

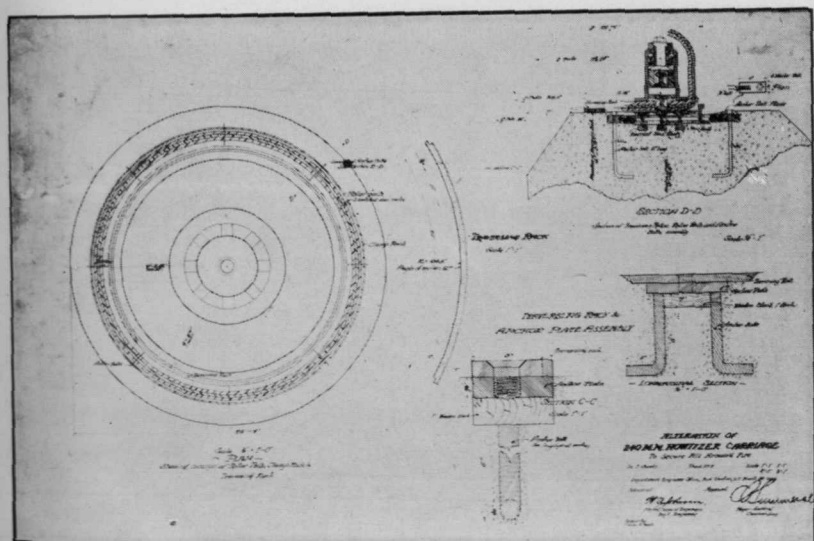


FIG. 4

pintle socket and thus carry the shearing stresses resulting from the horizontal component of the reaction during recoil. (See Fig. 1.)

Recesses are left in the concrete for placing the pintle plate and roller path assemblies which, after careful leveling, are grouted in.

Minor details of the design may be learned from an examination of the drawings. The only alterations to the carriage required by these plans are the removal of the pintle socket plate from the lower platform and the riveting of the pintle socket plate to the top carriage.

One experimental gun block has been constructed by the Department Engineer, with the assistance of the Department Ordnance Officer and the 55th Artillery, which furnished working field forces.

The excavation and concrete work were completed in one month, the site selected being in a very inaccessible locality and the resources limited. One month was allowed for "curing" the concrete, mounting the gun and making minor improvements and refinements.

On September 14, 1923 the gun was proof fired according to the following schedule:



FIG. 5

PROOF OF MODIFIED MOUNT

Rd.No.	Elev.	Expected Pressure.	Traverse.	Rd.No.	Elev.	Expected Pressure.	Traverse.
1	Min. (150 mils)	19,800	Center	4	Min.	26,400	Center.
2	Min.	26,400	Extr. Rt.	5	Max. (800 mils)	26,400	Center.
3	30	26,400	Extr. Rt.	6	30	26,400	Extr. Left
				7	Max.	26,400	Extr. Left

Note: Unfused projectiles used in proof firing.

ACCURACY TEST

No.	Rds.	Appr. Range						
10		5,000 yds.	Mk III filled cast TNT	Mk III, w/interrupter				
10		10,000 "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "
10		15,000 "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "

All rounds fired with howitzer at center traverse.

In the accuracy test, two additional shots were fired making a total of 39 shots. Of these shots 32 were fired at the same azimuth setting which is probably a greater test on the stability of the mount and the maintenance of accuracy of fire, with reference to the mount, than would ever occur in combat. There were no cracks or other indications of failure and no variation in accuracy attributed to the mount. The test is considered an unqualified success.

This essentially converts the howitzer into a fixed mount which is satisfactory for the purpose for which it is intended to be used in this case. The simplicity of the design, however, permits the restoration of the gun to its original condition with very little difficulty.

Extract from Annual Report of Secretary of War

Some individuals who believe in peace at any price claim that our expenditures for defense and our costs for past wars are chargeable to militarism. They fail to distinguish between offensive and defensive war, between the weapon in the hands of the criminal and the weapon of the policeman. They forget that the real causes of the great war were to be found in an economic and racial struggle of which military preparedness was but an outward manifestation. They forget that war was prevented from time to time only by the fact that even the most aggressive nation will hesitate to attack a peaceful opponent who is apparently well able to resist. During those lulls, which we call peace, the civilization of the world has progressed, and its progress has been possible only because of the defense measures of the peaceful states, the weapon in the hands of the police.

The expenditure of money for defensive measures actually decreases the cost of war itself. It is interesting to imagine what our past war costs might have been had we failed instead of having been successful in our struggles. We should have been deprived of much, if not all of our great expanse of territory, and, as a people, might have been in a condition of virtual servitude. The return from the cost of national defense has been existence itself. Are we now to turn back from the path along which we have progressed and to state publicly that we will yield our purposes before any who might have the power to obstruct them?

In playing this game of life, so long as separate nationalities and groups are elements of the game, we must be ready to resist any encroachments upon our own. Ready to cooperate with all, we will retreat before none.

The Reserve Officers' Training Corps and Duties of Officers on College Duty

By Major L. R. Watrous, Jr., C.A.C.



HE Morrill Act of 1862 was the means of commencing military education in our colleges; this act obligated all colleges that received income from certain lands donated by the Federal Government to include military science in their curricula.

The opportunity to place military education upon its proper plane was very limited because nothing was said in this Act regarding the scope of instruction, resulting in every state deciding the kind and amount.

The original law provided that the Federal Government would detail one regular officer at an institution and that it would furnish equipment, which was usually of some obsolete type. This inadequate help naturally relegated military instruction to a very low plane in the academic circle.

The National Defense Act of 1916, providing for the establishment of a Reserve Officers' Training Corps gave to every officer on college duty the opportunity of placing military education upon its proper plane.

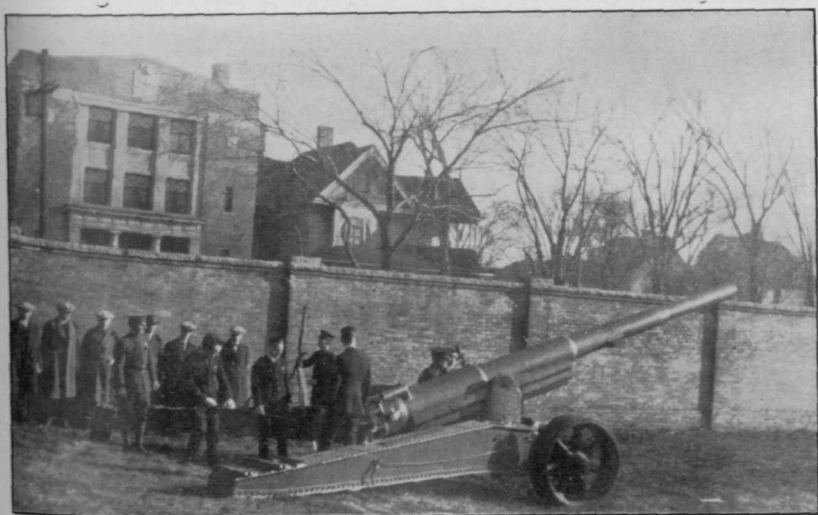
A study of the 1916 Law in connection with the Reserve Officers' Training Corps brings out the following points:

- (1) Law placed no limit on amount of supplies to be issued.
- (2) Permitted the Secretary of War to issue not only modern arms and equipment, but means of transportation, animals for cavalry and field artillery units, forage and subsistence.
- (3) Permitted units of all branches of the service.
- (4) Divided the course into Basic and Advanced.
- (5) Fixed the amount of time per week that each of the divisions was to spend on theoretical and practical military instructions.
- (6) Authorized camps of six weeks' duration for Basic and Advanced Courses, with transportation to and from camp at government expense.
- (7) Authorized the Secretary of War to prescribe a standard course.
- (8) Provided pay for the Advanced Course student while in college and camp.

(9) Provided the detail of adequate commissioned and enlisted personnel.

(10) Last, and most important, it recognized the product of the training, in that it provided for the individual receiving a commission as 2nd Lieutenant in the Officers' Reserve Corps.

The Reserve Officers' Training Corps had not commenced to function efficiently before the entrance of the United States into the Great War. For the most part, only Infantry Units had been installed. The R.O.T.C. establishment continued until the Fall of 1918. August, 1918, the War Department decided to mobilize every



155-MM. GUN DRILL—ADVANCED CLASS

element of strength in the nation for war purposes and as a part of this general policy, decided to use the equipment and staff of every reputable college and university for the training of soldiers. For this reason the R.O.T.C. was temporarily superseded by the Students' Army Training Corps (S.A.T.C.)

The gigantic experiment of the S.A.T.C., although it apparently received the heartiest cooperation from everyone, was not a success, or at least was far from satisfactory. The program of work was too heavy for the average student, being a combination of heavy academic schedule with many hours per week of drill. In most cases the discipline was poor, the instruction indifferent and the instructors not properly fitted for their responsibilities.

When the Armistice was signed, which quickly brought an end to the S.A.T.C., the work of organizing and establishing R.O.T.C.

units started again. The Coast Artillery established about fifteen units. A few have been withdrawn and others added so that at present the Coast Artillery has units at the following institutions:

1st Corps Area

Mass. Inst. of Tech., Cambridge, Massachusetts.

New Hampshire State, Durham, N. H.

3rd Corps Area

University of Pittsburgh, Pittsburgh, Pennsylvania.

Virginia Polytechnic Institute, Blacksburg, Va.

4th Corps Area

Univ. of Alabama, University, Ala.

Georgia Tech., Atlanta, Ga.

Mississippi Agricultural College, Agricultural Col., Miss.

The Citadel, Charleston, S. C.

5th Corps Area

University of Cincinnati, Cincinnati, O.

6th Corps Area

University of Michigan, Ann Arbor, Mich.

Michigan Agricultural Col., East Lansing, Mich.

7th Corps Area

Kansas State Ag. Col., Manhattan, Kans.

Univ. of Kansas, Lawrence, Kans.

Univ. of Minnesota, Minneapolis, Minn.

Washington University, St. Louis, Mo.

9th Corps Area

Univ. of California, Berkeley, Calif.

Univ. of Washington, Seattle, Wash.

DIVISIONS OF RESERVE OFFICERS' TRAINING CORPS

There are two divisions known as the Senior and Junior divisions. The Senior Division is organized at educational institutions which require four years' collegiate study for a degree. The Junior Division composes all Units at all other institutions private or public. (Usually limited to secondary schools).

The Senior Division has two separate courses of study:

1. The Basic Course

2. The Advanced Course

The Basic Course is the course of study given in the freshman and sophomore years. At practically all state institutions this part

of the course is compulsory; if no academic credit is given, it is, at least, a pre-requisite for graduation.

The Advanced Course is the work of the junior and senior years and is optional. The quality and number of students taking the Advanced Course determines the success of the Unit at any particular college.

SCOPE OF COURSES

In general, the Basic Course is intended to train a student in the duties of a non-commissioned officer. The Advanced Course gives the student that knowledge which ordinarily may be expected of a second lieutenant.

The following is the schedule of the Coast Artillery Unit at the University of Minnesota:

BASIC COURSE

Freshman Year

- (a) Infantry Drill
- (b) Physical Training
- (c) Gunners Instruction
- (d) Rifle Marksmanship
- (e) Military Courtesy

Sophomore Year

- (a) Infantry Drill and Physical Training
- (b) Topography
- (c) Gunnery, elementary
- (d) Gunners' Instruction
- (e) Motor Transportation
- (f) Hygiene

ADVANCED COURSE

Junior Year

- (a) Materiel
 - (b) Gunnery
 - (c) Orientation
 - (d) Gunners' Instruction
 - (e) Infantry Drill
 - (f) Command and Leadership
- The Advanced Camp is attended at the end of this year.

Senior Year

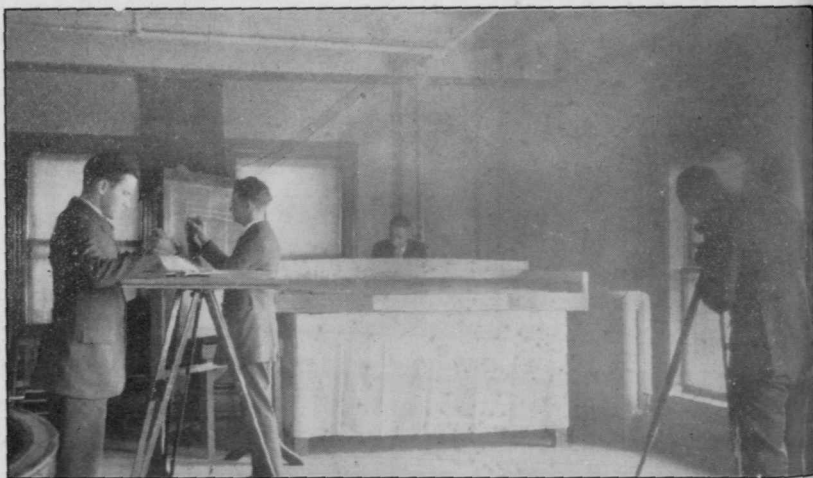
- (a) Gunnery
- (b) Orientation
- (c) Artillery Tactics
- (d) Field Engineering
- (e) Command and Leadership
- (f) Administration
- (g) Military Law
- (h) Military History

ACADEMIC CREDITS

In this connection a few words about credits may not be out of place. Every college has a set standard of points—credit hours or other measure for graduation or a degree.

The average American lad will not take the R.O.T.C. courses unless he is given academic credit for them. The young man entering college has a definite purpose in view. Service, especially National Service, does not seem, to him, part of his job as a citizen. Patriotic appeal means nothing.

Academic credit is necessary in both the Basic and Advanced courses where the whole course is optional; otherwise, academic credit is essential for the Advanced Course where the Basic Course is compulsory.



ADJUSTMENT OF FIRE PROBLEM ON PUFF BOARD

If a college is giving three credits per semester for two class room periods and three drills or two class room periods and one three hour laboratory per week, it is doing its full share.

Two big problems which every officer on R.O.T.C. duty has had to meet and which have not as yet been completely solved at many institutions are the matter of securing proper number of college credits for the military courses and the matter of fitting into class schedules the hours demanded by the military courses.

FACULTY COOPERATION AND ACADEMIC RELATIONS

A large University is a rather complex organization and it will take a long time to gain a knowledge of how the many departments function.

Every college has its traditions, customs and standards and it cannot be too strongly emphasized that every officer who is placed on R.O.T.C. duty must learn the characteristics and understand and

harmonize with his particular college surroundings. An officer, by virtue of his detail, becomes a member of the faculty.

The most important essential in the development of the military department is faculty cooperation. Get well acquainted with each dean and with each head of a department, and be able to talk, at least a little, to any professor on his sphere of activity. If there is a Campus or Faculty Club, join it, and a great many of these things will work themselves out naturally. There is a feeling in civilian life in general, which likewise prevails in college life, that army officers are undemocratic and clannish. The military cause will be strengthened and the feeling neutralized by knowing collectively and individually as many of the faculty members as possible.

Members of the faculty can be divided into three classes; those who are strongly opposed to military training, those who are in hearty accord with the aims of the Military Department, and those who are neutral (at a non-military college these are in the majority).

The thing to do, to cause the latter to take an interest in the Military Department is to invite them over to your classes or laboratory, tell them what is being done and how it is being done; and in a very short time the results will surprise you. They, undoubtedly, compare the Military Department to the department to which they belong and it is easy to show them that the Military Department is on the same level as their own. Nothing much can be done with the first class mentioned; but when the third class has graduated to the second, the outbursts of the opposition will cause you no inconvenience; real faculty cooperation may be expected and helpful academic relations will have been established.

Closely related to academic relations is the matter of community relationship. Every opportunity should be taken to play a part in the society of the community. Join the Athletic Club, if there is one; become a member of the Rotary Club or Kiwanis Club, or some other civic club. No opportunity should be lost to change the public's popular idea that army people are socially undemocratic.

Here at Minnesota we are trying a new experiment. The Athletic Department, in cooperation with the Military Department, has started a series of get-together parties with the faculties of the different colleges. For example, one evening, the faculty of the academic college is invited over to the gymnasium. After a talk fest and smoke, and when everyone is acquainted, teams are chosen for volley ball, basketball, indoor baseball, and other group games. Following the games, we end up with a few eats, and a dip in the pool. We will probably have each college department over twice during the school year, and the results so far, from every angle, are very satisfactory.

RELATIONS WITH STUDENTS

The relations to be maintained with students will depend somewhat upon the customs that exist at the different schools. Fundamentally there must be a knack of understanding boys and young men, and knowing how to get along with them; an officer must have the students' respect; he must know his job, and permit no opportunity for criticism. An officer should habitually set an example of courtesy and treat the students as young gentlemen. In the class room he must take the time to explain reasons, whenever necessity for same is shown. Reprimands must be given solely with the idea of preventing a repetition of a wrong act committed.



PLOTING ROOM DRILL—ADVANCED CLASS

COORDINATION AND COOPERATION WITH OTHER UNITS

All of the officers on R.O.T.C. duty at an institution, irrespective of their branch of service must stand together and must make it apparent to faculty and students that they represent and are working for the Army of the United States, and not their own branch of service. Any indication that the unit of any branch of the service is favored above others, will react unfavorably toward military training in the institution.

INSTRUCTION

A college schedule is so adjusted as to permit the proper sequence of courses, the utilization to full capacity of shops, laboratories and lecture rooms, and at the same time to prevent conflicts in

the requirements made, both of the academic staff and students. The Military Department usually embraces students from more than one department. The result is that it is often hard to find an hour during the week when all the students in the Military Department may be assembled for infantry formations, and in some cases, not enough can be assembled at one time to carry on the practical instruction in the plotting room. Therefore, in many institutions, it is necessary to repeat the same instruction to many small sections; while in some phases of instruction this is an advantage, more often it may be considered a disadvantage.

Twelve to fourteen hours theoretical instruction and six or more hours of practical instruction which is an average for one week's work does not impress one as being much work. If you add to this, the necessity of preparing properly as many as three separate subjects in a day, the marking of quizzes, thoughtful conduct of many recitations, individual conferences with students, and special assignments such as Rifle Team Coach, Supply Officer, Finance Officer, etc., you begin to realize that a college detail keeps one pretty busy.

A great part of the R.O.T.C. instruction can be given by lectures. In this work an officer owes it to his profession to carefully and logically prepare his lecture and forcibly deliver same, realizing that he appears before the student as a member of the faculty and is compared to the civilian members of the faculty, whose profession is teaching. There are many books on pedagogy and scientific teaching and all of us can improve by a study of such books.

It is believed that every lecture should be followed by individual effort on the part of the student such as quizzes or solution of problems.

As much of the practical instruction as possible should be carried on by the students of the Advanced Course to develop them in command and leadership.

It is hard to follow the relationship in many divisions of an academic course, but this is not true in the Military Department; and the tactical principles, relations and necessities involved in every item of military information, given the student, must be continually stressed.

One feature of the R.O.T.C. work which calls for careful attention on the part of officers is the utilization of the regular enlisted personnel. In most cases, the regular non-commissioned officers have fitted into the requirements of the R.O.T.C. with great success. It is important that the high standard of personnel conduct of these men should be maintained on the campus and in the community.

The subject of discipline is closely related to instruction. Outside of the strictly military institution, the usually accepted significance of the term cannot exist. The students are subject to the military department only during certain hours and prompt and regular attendance, good conduct and undivided attention, and the proper rendition of military courtesies during the periods of military instruction are the only requirements that can be enforced.

After almost four years' experience on R.O.T.C. duty, the writer is convinced that Military Science can be taught in college just as well as engineering, law or the liberal arts. The graduate engineer or lawyer must have some practical experience and practice before his services are valuable. The new Reserve Officer, the product of the Reserve Officers' Training Corps must be given his experience in the summer O.R.C. camp. The result is and will continue to be a well trained, efficient officer reserve.

Mission of the Organized Reserves

To provide a trained, organized, and balanced force which may be readily expanded and developed into an adequate war component of the Army of the United States to meet any major emergency requiring the use of troops in excess of those of the Regular Army and the National Guard.


The Organized Reserves as the third component of the Army of the United States, constitutes purely a war force and can be employed only in the event of a National Emergency declared by Congress.

S. R. No. 46. Par. 3c (1) and extract from Par. 3c (2) and (3).

Principles of Warfare, Business and Engineering

By Ralph Rainsford, Chief Engineer, Philadelphia Co., Pittsburgh.

*Reprinted with permission from Proceedings of the Engineers'
Society of Western Pennsylvania.*

 THE subject of my talk sounds rather formidable as I listened to it read by our Chairman. I want to assure you that what I have in mind is a very simple matter. I shall not make any statements of principles that are not self evident; but if I can present them to you so that they will attract your interest as they have attracted mine, so that you will give them some further thought and application, I shall be well rewarded for my effort.

I have been a student of military history and always much interested in the weapons of war both ancient and modern, so when I went to train at Plattsburg I foolishly imagined that besides trying to teach us the rudimentary elements of the soldier business, my instructors would at times lecture on the principles of war or refer me to text-books where those principles were enunciated in primer form. Most of you know that I was foredoomed to disappointment. Instead of appealing to my intelligence, they gave me pages and pages of Infantry Drill Regulations, Interior Guard Duty, etc., to memorize. As one student officer said, "They gave me a number, everybody barks at me, and I answer to a dog whistle."

However, in the course of time I emerged from the obscurity of the rear rank, rose to top sergeant, and finally to first lieutenant and got a chance to handle my platoon and sometimes the company in sham battle. I shall never forget that first week on the "hike." It was one of amazing disaster. The umpires killed me off three times on three successive days, and the Second Cavalry, regular army, finally captured me and the remnant of the company on the fourth day.

In despair I went to my Major, afterwards General —, and asked for some book on first principles. I recognized my blunders and the complete failure of the time schedule, but still believed there were some cardinal principles which, if I could grasp them, would open up a new world of possibilities. Greatly to my surprise, the Major, though he pointed out my errors, could not even tell me in

so many words what were the principles of Napoleon, which the war correspondents so glibly referred to. It was not until after the war that I found them, in a book written expressly for that purpose by General Townshend, (*My Campaign in Mesopotamia*, by Major-General Sir Charles V. F. Townshend. 1920. T. Butterworth, London.) because in no other place were they clearly set forth in the English language.

You will recall that by the time of the Franco-Prussian War, the French had completely forgotten the lessons of the Great Napoleon, but the Prussians had learned them by heart. By 1914, the French were again followers and students of Napoleon, the Germans had never ceased to be, but the English and ourselves knew nothing about him. The English have since taken up Napoleon, but we have not in this country, so far as I know.

I have emphasized Napoleon because he was not only a great military genius, but also because as a student of military history, he codified the wisdom of his predecessors, drew attention to the principles that governed the great generals of the past, showed that they were unchanging principles and made them his own.

I do not intend to outline these principles at length and show their application to civil life, whether business or engineering. It would be easy to do so, but you can do that at your leisure. I prefer rather to mention them briefly and then take up the method of their application. Why I intend to devote my time this evening to the method of applying a principle rather than to the principle itself is because the principles are self evident; they have only to be stated to be recognized as old friends, while the application of them involves us in much hard work and constructive thinking. Briefly the principles are:

1. The objective—the goal to be reached, or the mission to be accomplished. In a major advance by an army, it is known by all from general to private. Yet how often is the mission of an advance guard forgotten when the first shots are fired. Also, how many employees of any company could clearly and unhesitatingly state what is the objective of their employer. In civil life it is generally assumed, not stated, and is for that reason nebulous and uncertain.

2. Economy of force—concentration of effectives, avoidance of dissemination, and simultaneous effort towards the objective. In other words, do not try to do too many things at once, and leave the secondary objectives until the men or money can be spared. A good example of the proper application of this principle is the handling of the British Navy in the late war. It was concentrated in the North Sea and by its larger size blockaded the German Navy throughout

he war. It did not have to win the battle of Jutland. Although the Germans got the better of that engagement, they never dared try gain.

3. Strategic offensive. There is no use of being always on the defensive. Only the offensive, or in civil life initiative, will bring results. Naturally the offensive in war is directed at the enemy's weakest point; in everyday life, where the result will best repay the effort.

4. Rapidity or economy of direction—the shortest or the most judicious road to the objective sought. The longest way round may be the quickest way home. Your progress toward your objective must not be too greatly hindered. The quicker you start the sooner you will arrive.

5. Security. If your plans are to be carried out, you must have liberty of action. In war, you will cover your danger points with outguards, or flanking parties, etc., and in civil life, take out life insurance, provide duplicate equipment, and build to withstand unusual strains and accident.

That is all. There are only five points—objective, mass or economy of force, offensive, economy of direction, and security. Of course, volumes have been written about their application. They are so simple, so common-sense, it hardly seems worth while to mention them. Yet there are few men who can keep them all constantly in mind in considering any problem, whether in warfare or peace; and no general of whom I have ever heard, in going down to defeat, failed to violate at least one and generally several in a single operation. I believe also that these principles are equally applicable to business and engineering, and that no individual or corporation ever failed without violating these principles wholesale.

I do not mean to say that war, business, and engineering can be reduced to rules and that success or failure will ensue as these rules are obeyed or violated. They are not rules but principles. A man must be very wide awake when he judges his actions by them. A great man, a genius, will sometimes appear to violate them, and may actually do so, deliberately taking the risk in the hope of greater gain, but he knows what he is doing. The trouble is that most defeated generals have been in complete ignorance of the principles they violated and few of us in our daily life sit down to plan deliberately, or, having determined on our objective, have the patience and skill to work out the details for success as logistics aim to do in the military art.

Such things have nearly always been better done in navies than in armies and for perfectly logical reasons. A ship cannot leave the

dock without coal to drive her boilers, and without some sort of a crew; and the crew will not go aboard without some assurance that food is aboard. The very nature of the case drove naval officers into logistics—the study of the things necessary to be prepared in advance. But an army was on land, it walked on its own feet, and if it was not too large it could obtain some sustenance from the land. Whether it could fight was another question, generally merely assumed, along with such details as rifles, cannon, equipment and shoes.

You will recall Bryan's famous saying that if this country was forced into war, "A million men would spring to arms over night." He failed to mention where the arms were coming from. Logistics never bothered Mr. Bryan.

I have outlined the major principles of strategy: Objective, economy of force and the mass, offensive, rapidity, and security. The question in continental armies was how to drive these principles into the heads of the officers attending the war colleges. War is an extremely serious business. Errors are very costly and sometimes fatal. Therefore, it would not do to take any chances, and serious-minded and logical people like the Germans proceeded to analyze the problem in detail. They studied history; they studied Napoleon. They found that the principles of strategy had not changed from the earliest recorded history to the present time, although tactics changed with the weapons employed. Given a well disciplined army the problem then was to train the minds of the officers to think correctly.

On this point the Germans made a great contribution to strategy. They evolved a standard method for the solution of any strategic problem, called the "estimate of the situation." By this method any problem is divided into four parts:

1. The objective or mission.
2. The difficulties to be overcome.
3. The resources available.
4. The decision or plan.

This was the method adopted by the German general staff in the wars of 1866 and 1870 and it worked so well in war that the German government adopted it in solving civil problems. The phenomenal commercial and industrial growth of the German Empire from 1871 to 1914 was the wonder, envy and worry of all Europe, and I do not believe it would have been possible without the correct thinking and logical conclusions to which the Germans were aided by the habitual use of the estimate of the situation method.

Of course, this method merely reduces to a formula or equation the various steps necessary in any sound reasoning, and steps which are almost invariably followed in engineering construction, such as the building of a bridge. Yet it is safe to say that this method is not being followed in the planning of bridges on government authority by the city and county. I do not mean that the engineers of the city or county are at fault. I assume, of course, that they will design a suitable structure; but the estimate of the difficulties to be overcome, which are chiefly financial, and the estimate of the financial resources are seldom properly prepared or compared.

The more definite a problem the more clear cut will be its solution. Hence problems in administration do not as readily lend themselves to analyses as a problem in engineering design. When it comes down to building a structure, no one could succeed who had not consciously or unconsciously treated the problem as required by the estimate of the situation method. The four points you may remember were (1) objective; (2) difficulties; (3) resources; and (4) decision; but in practice the engineer does not properly sum up the difficulties, or even the resources.

The resources eventually translate themselves into the money available for the project, and the engineer is very apt to assume it will be forthcoming; otherwise the problem would not be in his hands. It is the business of someone else to raise the capital, and he seldom worries about that. Right here he makes a great mistake. If the engineer is not keenly interested in the cost of his project and in the financing of it, he not only lacks the urge to produce the most economical design, but also sooner or later he will let his employer or client in for a radically bad piece of engineering. By this I mean that a good piece of engineering is the simplest and cheapest design that will give the required results. The product must be judged not only from the standard of performance, but also of economy. The estimates are not something to be exceeded, but "bogys" beyond which expenditures must not go.

Most of us have no conception of the poor repute of engineers with financiers. It is because of the uncertainty as to the number of dollars they are actually going to spend. Land can be bought at a fixed price; materials can be secured at stated figures; the personnel can be hired. Then the engineers begin to submit estimates of the cost of future projects, and if they are not watched and controlled very closely they will succeed in involving the capitalist in far greater expenditures than were originally contemplated. Some cynic, I forget who, said that a wealthy man could drink and gamble and still retain his wealth. He could even become involved with

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women and survive, but if he placed his trust in engineers, he would eventually and inevitably be ruined.

So much for the resources. Now as to the difficulties. Finances come to the fore, but we have covered that. Roosevelt, in his autobiography, (Theodore Roosevelt; an Autobiography. 1913. Mac-Millan, New York.) mentions an officer in charge of some division of the War Department at Washington at the time of the Spanish War. The officer bitterly complained to Colonel Roosevelt, saying that his office was running so smoothly until the war came along and upset everything. That officer's plans had not even taken into account the main object for which his organization was created. He had no plans ready to meet the great crisis for which the army itself is created and maintained.

We can afford to laugh at the "arm-chair" officer, but how about our own jobs? The public-utility companies that I represent are charged with the duty of giving service. Recently the electrical division got up a plan, after a great deal of study, for rebuilding the network of electric circuits that give light and power in the down-town Triangle of Pittsburgh. The electric art has grown by leaps and bounds so that we have inherited all the things good and bad that our predecessors did and the structure must be rebuilt and systematized. These electrical engineers produced an excellent plan and brought it to me for approval. It was the work of many months. Electrically, I had no doubt that it was an excellent plan. I looked at it. I tried to look as though I completely comprehended it, and the more I looked at it, the more the conclusion was forced upon me that all that was wanted of me was to sign on the dotted line and not waste the valuable time of any hard-worked staff by asking unnecessary questions. I had my pen poised; then I began for the first time to think, what is the purpose of this plan—its objective? To serve the down-town Triangle efficiently, continuously, come hell or high water. That was enough. Immediately I saw my line of criticism. Had the engineer taken due account of flood? Oh, yes, here was the high-water mark. Of fire? No not particularly. Well fire and flood often go hand in hand. I will flood your city to the high-water mark and then I will have a big fire in this block (indicating a certain point). Now what have I done? He said "Oh, hell, half of the city is in darkness."

That engineer is an exceptionally good one, but had not fully taken into account the difficulties due to the elements. Electrical difficulties, his own specialty, he had followed with a fine-tooth comb, but he had not fully reckoned with the elements.

I referred a while ago to the problem facing the continental war colleges—a problem which the studious Germans very frankly faced. A few brilliant men had revived the Napoleonic principles and devised a formula for the solution of problems. What was required was to make this knowledge common to all their army and navy officers and to teach them how to think. They did not want to take any chances and they started at the very root of the matter when they taught the officers how to think.

Apparently it is perfectly possible to go through a whole course of instruction from kindergarten to post-graduate college course, without being taught how to think. Mathematics, grammar, Latin and Greek are excellent exercises in thinking and reasoning, but one can, so to speak, lock up one's knowledge of each of them in a separate compartment of his mind, and only apply to each the particular kind of reasoning required, and never apply it at all in any other sphere of activity whatsoever.

My own experience convinces me that most students need to have pointed out to them not only the necessity for thought, but also the mechanism for applying thought. I learned my lesson by accident, but the circumstances made a vivid and lasting impression on my imagination, and I find the estimate of the situation method extremely useful. In fact, I have organized the work in the Engineering Department of the Philadelphia Company along that line, with a Planning Division whose duties much resemble those of a General Staff of War and Navy, and with a method of procedure in laying out a job, for which I cannot claim originality, but to which I was driven step by step by the estimate of the situation method.

Objective, difficulties, resources—these will be followed, first, by planning; second, by securing the means wherewith to do; and, third, by doing. In military language, planning belongs to strategy; procuring the means belongs to logistics; and the doing of a thing belongs to tactics. The three steps are quite separate, and for their best accomplishment require rather different temperaments and qualifications. The brains and imagination required for the planning of strategy are not necessarily combined with the organizing and executive ability required for logistics or tactics. If you think of logistics as the service of supply, including the detail design and production of engines of war such as new types of battleships, aeroplanes, etc., you will note that the problem to be solved by logistics is outlined by strategy, and that the men and material produced by logistics, are operated by tactics in accordance with the plan laid down by strategy. I am sure that if our problems in civil life, say those of any individual company, were as clearly parceled out to

separate parts of the organization as they are—not in this country, but in a good Foreign War Department, many mistakes in organization would be avoided.

During the war I made a report on the British Air Service method of organization, and had at my disposal an enormous mass of information and the help of two British officers who were thoroughly versed in it. The problem was to condense the salient points into a short report that would be read and excite sufficient interest to ask for more detail. On paper, the British Air Service was the best and most ingenious organization that I have ever seen. It began with the Air Ministry—like a board of directors, only composed of competent specialists representing the usual officers, general manager, secretary, treasurer, controller, chief engineer, a representative of the Air Staff and a representative of the Ministry of Munitions. The requirements of strategy were laid before the Board by the Chief of the Air Staff. What he told them of campaign plans I do not know, but he laid down the requirements for logistics to work out. For instance, he would produce a plan calling for so many squadrons of each type of plane and give the requirements of each type. By this I mean that in specifying a combat plane he would comment upon the good and bad points of present types and then proceed to demand a plane capable of at least so many miles an hour, of remaining aloft so many hours, and of attaining a certain height. As for delivery, he wanted them yesterday; but that was what the rest of the Board was for. They told him they did not have the men, the money, or the materials, but perhaps they could do so and so and commence delivery in six months; and so a compromise was worked out and scheduled. It was scheduled in complete detail, not only for deliveries, but to dovetail in with squadrons to be replaced on all the numerous fronts where the British were operating from England and Archangel to Mesopotamia and East Africa.

There was a chart of renewals and replacements covering a six-months period and detailing every wing or squadron in service on all the fronts, the date it was due to be withdrawn, where it would go, and where the replacement would come from. That schedule was said to be accurate within about two weeks of time, and was probably no more subject to change than is the production program of the average industrial company. It was a magnificent piece of scheduling, of logistics—something that up to the time of the Armistice, which came a few months later, we were quite incapable of duplicating. Why we were incapable is another story. The war is over and we will not fight it over again tonight, but I wanted to give this example of a problem outlined by strategy and carried out in minute

detail by logistics, because it so closely parallels our problems in civil life as they confront the business man and the engineer.

You can all see, without my expanding the illustration, the part the engineer played in inventing, developing, manufacturing and scheduling the air fleet the requirements of which were set forth by the Chief of the British Air Staff; but, of course, the eminent gentleman was also aided and abetted by engineers, if he was not a first-class engineer himself. In fact, it has always been hard for me to imagine a great strategist who was not at least something of an engineer as well as a far-seeing person with great imagination.

The great military strategists like Alexander the Great, Cæsar, and Napoleon were great engineers and inventors also. They were geniuses, but my object this evening is to point out that they left behind them certain simple principles—self-evident truths applicable not only to warfare but also to government, business, and engineering; that, later, the methodical Germans thought so much of these principles that they applied them not only to war, but also to business and engineering, and did so with most conspicuous success; and, wishing the knowledge of these principles to be the common property of all those in command, they evolved a method for the solution of problems of war, and government business, which method is called the estimate of the situation. By this method the objective sought is first clearly defined, then the difficulties are studied, and then the resources. The final plan can then be undertaken rationally.

In our everyday life we follow this sequence unconsciously; but, because it is unconscious, neither the objective, the difficulties, nor the resources are defined as clearly as they should be.

I was riding to work the other morning in the street-car and stood up all the way from Squirrel Hill to Grant Street. Beside me was another man who complained of the service that compelled him to stand. He "cussed" the management and kicked at the 8 1/3-cent fare. I listened to him until he ran down, and everyone near by was listening to him and silently backing him up. I said "What do you want first, better service or a five-cent fare? You know perfectly well you can't have both now." He looked at me and said: "I vote for service. I would rather pay 10 cents and get a seat and more speed;" and the crowd seemed to agree with him. In other words, he had not even defined his real wants—his objective—yet only a few seconds reflection as to what his objective really was, made his conclusions rational.

We have an 8 1/3-cent fare in Pittsburgh today because five years ago nobody would stop to inquire what were the difficulties and what the resources of the Pittsburgh Railways Company. The

management's objective was to continue to operate and to give service. The public's unthinking objective was a five-cent fare, and they brushed aside the question of difficulties and resources by saying, "The company is rich," or by the still more intellectual argument of "Five cents is enough." The company went into a receivership, and, whereas a seven-cent fare might have saved them, they were directed by the courts to charge $8\frac{1}{3}$ -cents, and the fare will have to remain until service—the true objective of the company—is actually established, and that is some years off.

We started out with the principle of strategy and have ended with our local municipal problems. I have tried to show that they should both be approached in the same manner.



EDITORIAL

Annual Report of the Chief of Coast Artillery

EXTRACTS from the Annual Report of the Chief of Coast Artillery for 1923 appear elsewhere in this issue of the JOURNAL. The part dealing with "personnel" is published practically in full because many Coast Artillery officers do not know of the existing conditions regarding the size of the Coast Artillery Corps. The Report sets forth these conditions and also acquaints the reader with the efforts which have been made and are being made for their improvement. The Report has brought forth a number of editorial comments from various newspapers. The Chief of Coast Artillery, fearing that some of the statements appearing in the *Washington Post* editorial might prove misleading to the layman, invited their attention to this fact in a letter dated December 4. The *Washington Post* editorial, General Coe's reply thereto, and an editorial from the Charlottesville *Progress* follow.

AN EDITORIAL IN THE WASHINGTON POST, NOV. 25, 1923 NEW COAST DEFENSE PLAN NEEDED.

The subject of coast defense in all its phases is brought to the front by the annual report of Maj. Gen. F. W. Coe, chief of coast artillery, who shows that many of the harbors of the United States are without any protection, and that even the most important of them would be without adequate protection in case of emergency. This is because of the decrease in personnel. Gen. Coe recommends that more men be provided through an increase in the authorized strength of the regular army for allotment to the coast artillery corps.

Because of lack of appropriations, many coast batteries will remain without fire control systems. Additional batteries provided with 16-inch guns are being provided as fast as appropriations will

permit. The corps is also at work developing four types of anti-aircraft guns. One of these is a 50-caliber machine gun, with a straight-up range of 9,000 to 12,000 feet, firing 500 shots a minute, with fire control maintained by new tracer ammunition visible by night as high as 7,500 feet, and by day as high as 5,000 feet. The second new gun is a 37-mm. machine gun firing explosive shells which will detonate upon striking a balloon fabric. The third new gun is a 3-inch mobile weapon firing 15 shots a minute to the height of 21,000 feet. The fourth is a 4.7-inch gun, firing a 45-pound shell to 30,000 feet at an elevation of 80 degrees.

This sounds formidable, and of course it is commendable to develop anti-aircraft guns; but it has been demonstrated long ago that airplanes are virtually immune to attack from the ground.

The fact that the Coast Artillery Corps is trying to develop defensive ordnance against aircraft is in itself a confession of the defenselessness of coast fortifications as against attacks from the air. It is also a revelation of the uselessness of coast artillery in keeping off an invading naval force unless this coast artillery is supported by an air force.

The big guns of the coast artillery can not keep enemy air forces from flying overhead and demolishing the coast forts and the big guns. Anti-aircraft guns will not deter bombing planes from doing their deadly work. The only known means of preventing the destruction by airplanes of the United States coast defenses, including the new 16-inch guns, is to provide a defensive air force that can out-fight any enemy air force.

The coast artillery's big guns can prevent a naval force from taking American harbors if the enemy is unprovided with an effective air force; but if the enemy has an air force and the coast artillery has no such support, then the approaching fleet can send out its air force, destroy the forts and big guns by airplane bombs, and then take the harbors.

"Why didn't the British navy and air force do this at Gallipoli?" is the natural question. The answer is that the British forces at Gallipoli were far inferior to modern forces. At that time no airplanes carried bombs worth mentioning. Now bombing planes carry 2,000-pound bombs for hundreds of miles and successfully drop them upon battleships, accomplishing their utter destruction within a few minutes, as was demonstrated on September 5 off Cape Hatteras. The speed of airplanes has greatly increased since the struggle at Gallipoli. Offensive development has far out-stripped defensive invention in the air branch of warfare. The only defense worth while, in fact, is counter-offensive preparation.

Obviously the whole coast defense system of the United States is in need of an overhauling to bring it up to date. There is no advantage in providing big guns and extra personnel for the coast fortifications if these fortifications are left defenseless against an air attack which could easily destroy them. What is the best plan for defending the coast fortifications against air attack? No one knows. It has not yet been demonstrated whether airplane defense stations should be established at suitable places alongshore, or whether these stations should be established off shore, ready to attack an oncoming enemy before he can reach the coast. Indeed, the Army as a whole is not yet ready to admit that air forces are necessary as defenses for coast artillery.

The fundamental fact that mankind has entered a third element, as important as land or water, has not yet penetrated the military intelligence of the United States. The tendency is to minimize the possibilities of aerial warfare, and to subordinate this branch of warfare to military and naval warfare. A proposal to expend as much money on aerial warfare as is expended on the Army would leave Army officers aghast. Naval officers would be similarly affected if it were proposed to make the air force coequal with the navy. But why not? The question is not one of past tradition, but of present fact and future probability based upon fact. If man's invasion of the air has made armies and navies helpless unless defended by air fleets, it is incumbent upon the United States to provide an air fleet capable of defending its army, its navy, its coasts, and its territory. Therefore the coast defense problem is more than one of providing more personnel or additional 16-inch guns and new anti-aircraft guns.

Congress should appoint a joint committee to inquire into the subject and report back a comprehensive plan for the modernization of the coast defenses of the United States.

GENERAL COE'S REPLY TO WASHINGTON POST EDITORIAL

. Washington, D. C.,
December 4, 1923.

Editor, Washington Post,
Washington, D. C.

Dear Sir:

I beg leave to refer to the editorial in your issue of Sunday, November 25, 1923, under the heading "*New Coast Defense Plan Needed.*"

I feel sure that the policies governing your editorial staff in matters of this nature are based primarily upon a desire to advance the welfare of our country and to present to the public the true situation, to the end that our defensive measures may be most effective and may be accomplished at a minimum of expense.

Acting upon this assumption, I am taking the liberty of writing this letter and requesting that you give it adequate publicity.

I do this because the tenor of your editorial seems to me to be misleading to the layman, and likely to have an effect exactly the opposite of that, which I am sure you desire to impress upon the minds of those who will be called upon to decide what measures should be taken to insure, so far as possible, the best defense of our coast.

In the first place, your editorial details information extracted from my annual report bearing upon the shortage of personnel in the Coast Artillery Corps, regarding which condition you make no comment. You then give certain data with reference to the development work reported upon by me in antiaircraft guns, regarding which subject you remark, "This sounds formidable, and of course it is commendable to develop antiaircraft guns; but it has been demonstrated long ago that airplanes are virtually immune to attack from the ground." I do not know from what source this statement was derived, but I wish to assure you that the facts in the case warrant no such conclusion.

If any one is sufficiently interested to analyze the situation regarding the fire effect of the antiaircraft guns under development, the designed characteristics of which you set forth in your editorial, he will find that, with a reasonable number of these guns, properly placed about any point to be defended—such as a coast fort—the space above that point can be made untenable for airplanes up to a height of 10,000 feet, and exceedingly dangerous up to 30,000 feet.

Now, let us calmly take stock of what the actual facts indicate as to the possibilities of the enemy's offensive—in this case, bombing airplanes. The only demonstrations so far made, upon which we may base our judgment in this matter, are the bombing of the German ships off the Chesapeake Capes some two years ago, and the bombing of the *New Jersey* and *Virginia* off Cape Hatteras last September. Regarding this latter demonstration, you remark in your editorial "Now bombing planes carry 2000-pound bombs for hundreds of miles and successfully drop them upon battleships, accomplishing their utter destruction within a few minutes, as was demonstrated on September 5 off Cape Hatteras." This is not a statement of fact in one particular and is certainly misleading in its general purport. It was *not* demonstrated on that occasion that bomb-

ing planes could accomplish the utter destruction of battleships *within a few minutes*. Twenty-four bombing planes were engaged from about 8:00 o'clock a.m. until about 4:30 p.m. The *Virginia* and *New Jersey* were sunk, respectively, at about 3:00 p.m. and 4:30 p.m.: seven hours to destroy the *Virginia* and eight hours and one-half to destroy the *New Jersey*. The statement is wholly misleading because it is silent regarding the fact that the ships being attacked were anchored, were wholly without any means of defense, and that the bombs which actually destroyed the ships were dropped from altitudes not greater than 3,000 feet. Imagine these same ships under way and provided with reasonable antiaircraft gun defense, making the space above them untenable up to 10,000 feet, and exceedingly dangerous up to 30,000 feet, and, while we have, as yet, no data bearing upon the possibilities of bomb dropping under these conditions, a limited ability in imagination makes the situation of the battleship appear far from hopeless.

Another statement in your editorial is as follows: "The fact that the Coast Artillery Corps is trying to develop defensive ordnance against aircraft, is, in itself, a confession of the defenselessness of coast fortifications as against attacks from the air. It is also a revelation of the uselessness of Coast Artillery in keeping off an invading Naval force unless this Coast Artillery is supported by an air force." The first statement is of course, correct, if we exclude from the term "Coast Fortifications" all antiaircraft defense. Needless to say, the big guns of our coast fortifications were never designed to defend *themselves* from attack by airplanes, nor were any of the troops which form a part of a Field Army designed to protect themselves from this form of attack. Attack by air is a form of attack unknown to military science before the World War and demands the development of entirely new defensive measures. Antiaircraft artillery is the answer. The second statement again disregards entirely the antiaircraft gun defense and gives support to the idea that all is lost unless we can present, at all times, at any point which an enemy may choose to attack, a sufficient preponderance of fighting aircraft to destroy all enemy attacking planes.

As I view the probable future development in the offensive aircraft and defensive antiaircraft service, I can come to but one conclusion. It is a basic principal that the best defensive is the offensive-defensive. It is upon this principal that coast defense gun are emplaced—to relieve the Navy of the responsibility for the defense of the coast, thus releasing it to take the offensive against the enemy's naval forces and lines of communication. This identical condition obtains with respect to the Air Service. Its primary mis-

sion is offensive action against enemy aircraft. If we tie it down to the defensive role of protecting all points which may be subject to the enemy's attack by aircraft, it will never be possible for it to take the offensive and accomplish its primary mission. Antiaircraft artillery, at the present writing, gives promise of supplying these defensive measures to a very satisfactory degree. I therefore wish to state that the development of antiaircraft guns is not only "commendable," as stated in your editorial, but that their development and the training of an adequate personnel in their operation is a vital necessity.

Is it not a rational thought that history is but repeating itself in this matter? Upon the advent of the torpedo boat in Naval armament, many uninformed or misinformed persons were convinced that the battleship was doomed—again, the same extravagant statements, when the torpedo boat developed into the destroyer—again, upon the advent of the submarine. In spite of it all, the best military minds of the Navy prevailed, and the battleship has survived all these onslaughts. Similarly, now comes the airplane, and again, these uninformed or misinformed persons are scrapping—not only the battleship, but practically everything else except airplanes; and this, even before development of either offensive or defensive measures have progressed to a point where the limits can be foreseen or predicted.

I wish to counsel moderation in this matter. We have a Navy and we have coast fortifications. These installations have cost us millions of dollars. Before we entertain, for a moment, the thought of scrapping them, let us be perfectly sure that they are no longer useful; and furthermore, considering the tremendous importance of the great centers which our fortifications protect from possible hostile agencies already in existence, is it not wise to provide, as I have recommended in my report, sufficient personnel for manning and operating them to give us a reasonable degree of protection in case of emergency?

F. W. COE,
Major General, U. S. Army,
Chief of Coast Artillery.

AN EDITORIAL IN THE CHARLOTTESVILLE PROGRESS NEEDS OF OUR COAST DEFENSES.

No matter what division of opinion there may be as to the strength at which our standing Army ought to be kept, it may be fairly claimed that the necessity exists to provide amply for the maintenance of the Coast Defense forces at the maximum necessary

for every emergency. Indeed, it may be said that the general insistence on having the regular Army establishment reduced to the lowest figures compatible with the largest efficiency is due in large part to the feeling of security produced by the impression that the national safety is always assured by the recent development of the Coast Defense system.

This being the case, there will be more than ordinary interest, if not concern, aroused by the startling facts revealed in the report just made public by Maj. Gen. F. W. Coe, chief of the Coast Artillery. Contrary to general understanding he states that owing to the decreases made during the last fiscal year in the number of enlisted men in this service, many of our fortified harbors are left without any protection whatever, and none of them, even the most important, with anything like an adequate protection in any emergency. This is a matter that well may enlist the notice and intervention of the Representatives in Congress, regardless of locality, and ought especially to be given careful and prompt attention by our Virginia delegation. Aside from the benefit to the various localities where these military posts are located in Virginia, the whole State is directly interested and concerned in having her sea approaches adequately guarded against any sort of attack from without. Both at the Virginia capes and Fort Monroe on Hampton Roads, are located some of the finest modern forts in the whole country, and the people will be justly alarmed, if there be any slackness or lack of provision in maintaining any of them up to the highest state of efficiency as to equipment and man power.

The General's report indicates that notwithstanding the fact that at all these stations the best modern equipment in guns has been provided since the war period, the Coast Artillery Corps' strength is now less than at any time since 1901. And he goes on to state: "The importance of this matter is such and the necessity for the increase so great I feel impelled to urge, if it can be accomplished in no other way, that it be secured through congressional action in the form of an increase in the authorized strength of the regular army for allotment to the Coast Artillery Corps."

Because of insufficient personnel to man the guns in the coast defenses of Continental United States, General Coe said, it was impossible in the last year to meet "the great necessity for increased number of coast artillerymen on duty in the Panama Canal Department." The report also included "many of our modern batteries will continue to be without any system for fire control and adjustment for many years, unless substantial increases in appropriations be obtained from Congress."

COAST ARTILLERY BOARD NOTES

"Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed may be *sent direct* to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration."—

JOURNAL OF U. S. ARTILLERY, June, 1922.

Work of the Board for the Month of November, 1923

A. NEW PROJECTS INITIATED DURING THE MONTH OF NOVEMBER, 1923

Project No. 183, Consolidation of Radio, Signal and Meteorological Stations and Personnel.—1. Present regulations require the maintenance of radio stations, signal stations, and meteorological stations in each coast defense.

2. All of these stations are of the type that require, practically speaking, a watch to be kept during the daylight hours.

3. Referring particularly to Artillery Bulletin No. 92, (Serial No. 103), it will be noted that generally the location and construction of the signal station is such as to make it suitable for use also as a radio station and as a meteorological station.

4. Between the duties of radio men and signalmen there is a very close relation. Graduates of the radio course of the Enlisted Specialists' Department, Coast Artillery School, are given instruction in all forms of visual signalling, (except ardois, which now appears to be obsolete). Hence, it follows that the logical noncommissioned officer to be placed in charge of the signal detail is the radio sergeant.

Thus it appears that inasmuch as the open location and high mast of the signal station makes it suitable for use as a radio station, and as the actual instruction given to radio sergeants renders them most available as chief signalmen, and as both radio and visual signalling are used customarily and chiefly for communication with ships, the personnel and materiel covering these two phases of communication should be combined for sake of economy and efficiency.

5. As previously stated the prescribed construction and location of the signal station generally renders it suitable for use as a meteorological station and the question of the combination of the meteorological detail and station with the signal and radio detail and stations resolves merely to a question of economy of materiel and personnel, as there is no particular similarity between meteorological duties and those of the signal and radio detail. The meteorological work should be supervised by a master gunner, but in view of reduced personnel of the coast defenses it will probably not be practical in general to keep full daily records. Partial records could well be kept by signal and radio men on watch and the training of the meteorological detail proper, particularly in determining the wind aloft, might be confined to those hours ordinarily allotted for artillery drill.

6. The instructions contained in Artillery Bulletin No. 92, (Serial No. 103), seem to be still in force. In part this bulletin provides that signalmen keep a record of all foreign vessels entering or leaving the harbor. This record is of no practical value, so far as merchant vessels are concerned, to the coast artillery, except that it serves to train the signalmen and keep them on the alert. It is believed that at those defenses where vessels of our own Navy arrive and depart frequently, sufficient training in visual signalling could be obtained by communication with the Navy as prescribed in Par. 409, Army Regulations.

RECOMMENDATIONS:

1. It is recommended that coast defense commanders be authorized to combine radio, signal, and meteorological details and stations, in whole or in part, when in their opinion the local conditions are such that economy in personnel, without loss in efficiency, will result from this procedure.

2. It is recommended that coast defense commanders be authorized to relieve the signal detail from the duty of recording data concerning foreign merchant vessels when in their opinion the keeping of such data serves no useful purpose.

3. It is recommended that visual signalling by ardois be abolished, provided, as appears to be the case, this system of signalling is no longer used by the Navy.

Project No. 184, Coast Artillery Board Mobilization Plan.—Owing to the secret nature of this study a report of the project cannot be published here.

Project No. 185, Questionnaire for Battery Commanders—Devices for Moving Target Firing.—It is proposed to secure from all Coast Defenses and Coast Artillery Regiments reports describing in detail the methods and devices used at each battery in action against moving targets, together with drawings of improvised devices if necessary to a complete understanding of their construction and operation. These reports are to cover all fixed defense batteries whether in or out of service.

It is believed to be especially desirable that each battery, whether in or out of service, should have immediately available the best of the methods and devices designed to facilitate the firing of that battery against moving targets.

Project No. 186, Zone Correction Ruler for Mortars.—(Submitted by 2nd Lieutenant A. C. Spalding, C.A.C.)—This is a device for computing the correction to be applied in a new zone when changing zones in mortar firing. It is based on the assumption that the correction to be applied in the new zone is equal to the correction applied in the old zone multiplied by the ratio of the mid range of the new zone to the mid range of the old zone. The device is being considered by the board.

Project No. 187, Meteorological Instruments for Antiaircraft Organizations—Determination of Effect of Distance between Meteorological Stations.—Correct meteorological data is essential to accurate antiaircraft firing. At present separate antiaircraft battalions are not equipped with the necessary instruments. If the nearest Coast Defense or Signal Corps meteorological station can furnish the data required, such equipment might be considered unnecessary. Tests will be conducted to determine if possible the area over which the meteorological message secured at any station will serve accurately. Observations to secure wind aloft data will be made simultaneously at Fort Monroe, Fort Eustis and Langley Field. Results of this study will be published later.

Project No. 188, Target Practice at Reduced Velocities.—In the case of certain 14-inch guns the service muzzle velocity is 2350 f.s. while the target practice velocity is 2250 f.s.; also range scales are graduated for a standard weight projectile and frequently it becomes necessary to fire a projectile of non-standard weight. The use of range conversion, or range-range relation tables is objectionable if it can be avoided.

In considering this matter the Board recommends that reduced muzzle velocities be used for target practice with high velocity guns.

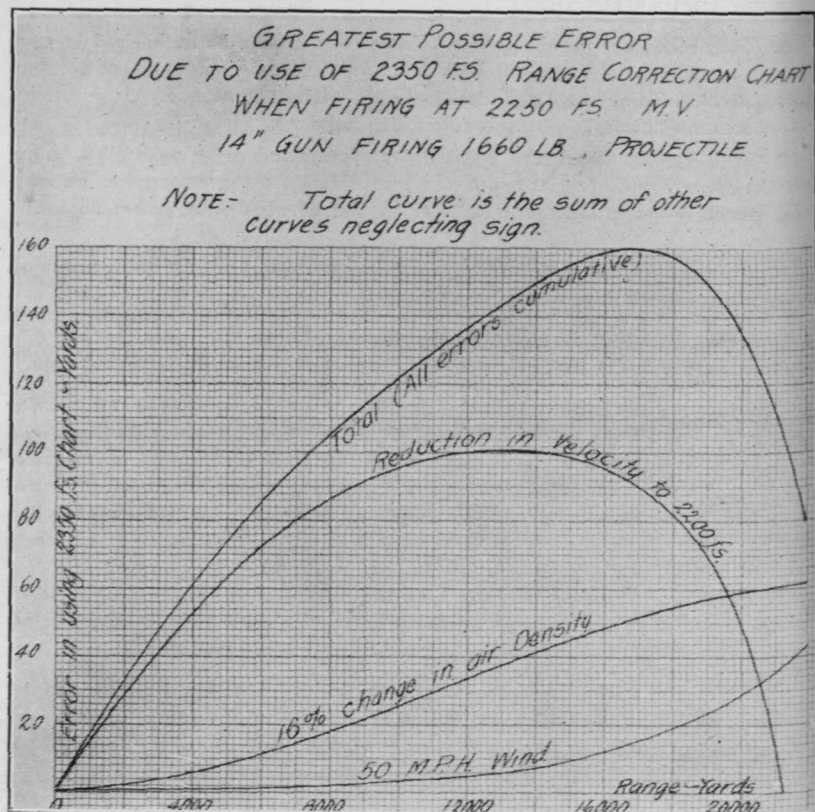


FIG. 1

The Board made a study of the errors that would result if the range correction chart furnished a 14-inch battery based on a muzzle velocity of 2350 f.s. were used although the muzzle velocity was actually reduced to 2250 f.s. The use of the range correction chart under this condition appears feasible. Figure No. 1 shows the errors that would result at different ranges and under different conditions.

With the modification in plotting room methods and devices which the Board is prepared to recommend, the proper setting on the range drum of the gun corresponding to the elevation for the corrected range of a set-forward point can be determined without inconvenience or loss of time whether the range drum be graduated in elevation or in ranges corresponding to a different velocity or a dif-

ferent weight of projectile, (or both), than given in the range table used in the firing.

By use of the "Percentage Corrector" described and recommended in paragraph 10 and 11, of report of the Coast Artillery Board on Coast Artillery Board Projects Nos. 170 and 152, published in the December, 1923, issue of the *COAST ARTILLERY JOURNAL*, the difficulties in the use of reduced muzzle velocities or non-standard projectiles disappear. The range tape of the device may show either elevations or ranges corresponding to a velocity different to the one used, set opposite the ranges determined for the range table velocity used. This permits the information necessary for laying the gun to be read off with equal ease and accuracy in whatever manner the range drum be graduated. It is believed, however, that all range drums should be graduated in elevations in addition to the ranges corresponding to the standard velocities, that if but one set of graduations be practicable that it should be in elevations. This will facilitate laying for sub-caliber practice, or for service firing with velocities and weights of projectiles differing from those prescribed for the standard ammunition.

The percentage corrector was designed primarily to permit corrections determined, (either in yards or in percentages), from the range correction board to be applied instantly to each set-forward range and at the same time to permit deliberate operation of the range correction board, thus avoiding the inaccuracies and errors which result with the present methods of correcting the plotting board range. For a target of rapidly changing range, the range correction board correction in yards will be different for each time interval of 30 seconds. If the proper correction be applied as a percentage correction, the change in the magnitude of the total correction will be infrequent, but if applied as flat correction it will vary continuously, making it necessary to determine and apply a correction from the range correction board for each set-forward range determined on the plotting board. By the use of the percentage corrector this need not be done.

In addition to the foregoing advantages the percentage corrector appears to present a satisfactory method for determining firing data when reduced velocities or non-standard projectiles are used.

Project No. 189, Coast Artillery Signals.—These were received and tested. The signals consist of smoke bombs to be dropped from aircraft. They were designed to be seen at a distance of 25000 yards. Report of test to be published later.

B. PROJECTS AND STUDIES COMPLETED DURING NOVEMBER, 1923:

Project No. 156, Range Tables, 8-Inch Howitzer, Mark VI, Model 1917.—Certain minor changes in the form of the above named Range Tables were recommended.

Project No. 166, Study and Test of 3-Inch Antiaircraft Guns on Carriage Model 1917 (Fixed Mount).—After a thorough study and test of this weapon the Coast Artillery Board arrived at the following conclusions:

1. From Test "A"—Test of the Accuracy of the Vertical Sighting System.
 - a. The vertical sighting system is subject to such variations and inaccuracies that it is not suitable for use in laying an antiaircraft gun.
 - b. These inaccuracies are not inherent in the "follow the pointer system," but in the mechanism as now constructed.
 - c. The range disc is incorrectly graduated.
2. From Test "B"—Test of the Accuracy of the Lateral Sighting System.

The accuracy of the lateral sighting system is satisfactory, except that the scale of graduations should be increased so as to give a least reading of 2 mils maximum.

3. Study of the operation of the sighting system.

a. The lack of both elevation and azimuth scales is a serious detriment. These scales are required for various purposes even with the present fire control system, for example, in the trial shot problem, wind problem, night fire by sound and prepared or barrage fire.

b. The lateral deflection scale should be equipped with an arbitrary correction scale as in the case of the vertical deflection system.

c. The lateral scale, where the whole scale is visible, prevents the operator from making an error in applying a small deflection either side of normal. The vertical scale, to obviate this possibility, should be marked with arrows and the words "increasing" and "decreasing" or it should be constructed similarly to the lateral scale.

d. The sight proper is not satisfactory. Partially this is due to the optical and mechanical design of the sight and partially to deterioration of the sight. The latter factor is mentioned because many of these sights have been so effected and it is presumed to be inherent in the construction of the sight.

The protective rubber eye cap is too small. The crosshairs in the glass are too coarse. The sight is not equipped with a collimator which prevents the pointer from finding his target except with great difficulty.

e. The sight elevating and traversing mechanism is not satisfactory because it does not function smoothly and easily and is not convenient to the pointer.

f. From a consideration of convenience and ease of operation the vertical system is entirely satisfactory, but the lateral system including the sight, is quite the reverse. The gun pointer and traversing detail continually interfere with each other and the lateral follow the pointer system when the pointer does not traverse the gun will result either in slow or inaccurate fire.

4. Study of the traversing and elevating mechanisms.

The traversing and elevating mechanisms are operable but are not as easily operable as desirable or as possible and are therefore not satisfactory. The ease of operation is affected by the gearing system, the balance of the gun and the leverage obtainable on the operating handwheels. If necessary both the elevating and traversing handwheels could be made of the type used on major caliber guns. No objection to this from an antiaircraft viewpoint is foreseen. These handwheels should be placed so as to be convenient to the operator which is not the case in the present traversing handwheel. The present disengaging clutch and double gear ratio (traversing) are desirable. A depression stop should be placed on the elevating rack to prevent jamming at the minimum angle of elevation.

5. From Tests "E," "F" and "G."—Study of the operation of the gun using drill ammunition, study of the operation of the gun firing with automatic opening of breech block and study of the operation of the gun firing without automatic opening of breech block.

a. The rate of fire obtainable with the gun both with automatic and hand breech operation is entirely satisfactory up to about 1000 mils elevation. It should be possible to fire this gun at a three (3) second cadence with ease under the conditions of the test, that is, no fuse settings and no sighting system used. In fact this is essential if the gun is to be fired at a four (4) second cadence under normal conditions. Failure to attain this cadence in the firings made was attributable to the slowness of the breech detail and failure of the firing mechanism.

b. The conclusions following are based on the premise that both automatic and hand operation of the breech are necessary. In these firings, the automatic action of the breech block was entirely satisfactory. Failures in this mechanism are known to have occurred, and even though the necessity therefor has not been shown in this test, it is believed that the question of strengthening the cover latch spring, the operating cam and the chain attached to the closing spring should be considered.

c. It is believed that the difficulties encountered in loading at high angles can be overcome in two ways or a combination of the two. In the first place the trunnions of the gun could be raised 6 to 8 inches without causing great difficulty in loading at 0 degrees elevation and this amount would greatly increase the facility of loading at high angles. As an alternative, that part of the racer between the two sides of the pivot yoke could be depressed about the same amount and the concrete emplacement outside the racer set down similarly. In any event the raised portion of the racer containing the 360 degree contact should be set flush with the racer because loading above 1450 mils is impossible with this contact housing raised.

d. The possibility of projectiles dropping out of the breech at high angles constitutes a danger to the gun crews. This danger is serious enough to warrant sinking the primer below the base of the case and lengthening the firing pin or covering the racer below the gun with cocoa matting or some such material, or both.

e. The first factor militating against the convenient hand operation of the breech at angles of about 1100 mils is the rear edge of the pivot yoke. As long as the right side of the pivot yoke extends as far to the rear as it does, it will be impossible to open the breech by hand with convenience. If the right side of the pivot yoke could be redesigned so that it would not extend behind the operating handle when the gun is elevated to high angles, hand operation could be made easy.

f. The second factor militating against the hand operation of the breech at high angles is the operating handle itself which, at such angles, must be pushed forward against the tension of the closing spring, in such a position that the operator can obtain practically no leverage.

Another bad feature of this handle is that in maintaining a rapid cadence of fire (hand operation) the breech must be opened immediately after or during counter recoil. To do this the operator must reach for the operating handle during counter recoil and in so doing is likely (as demonstrated on several occasions), to catch the fingers of his right hand and crush them between the forward edge of the breech and the cradle. This can be prevented by constructing a shield, by training the operator to keep his hand on the operating handle during recoil, or by offsetting the handle. Because of the latch plate it is practically impossible to construct a shield which would not in itself be dangerous. In the second suggested method the operator is very likely to eject the loaded shell before firing. The offset handle would solve this difficulty and that mentioned in (f) supra as well.

This offset handle (offset to the right) should be inclined to the front when the handle is vertical, so that a downward instead of backward force can be exerted on it in its downward position when the gun is elevated to high angles. This again is dependent upon the modification of the pivot yoke as the limit of elevation with an offset operating handle and the present pivot yoke is about 950 mils.

g. In several respects the present firing assembly is not satisfactory. It is not reliable. The firing handle is in a very inconvenient position and its movement is in such a direction as to be inconvenient and finally the gun should be fired by the breech operator and not by a cannoneer who cannot oversee the breech. For ordinary operation it is very satisfactory to hook a 4 inch lanyard in the eye of the trigger shaft with which the breech operator can fire the gun easily. The firing mechanism operated thus would be absolutely reliable. However, this lanyard pull must be in the plane of movement of the trigger shaft, and above about 1200 mils elevation it is dangerous for the operator to lean over to make such a pull. If an eye were set in the rear of the right side of the breech through which the lanyard could pass, the lanyard pull could be made in any direction convenient and safe to the operator. It is probable that the firing assembly would have to be redesigned to accomplish this as the present throw of the trigger shaft (34 degrees) brings the end of that shaft practically to the rear face of the breech block.

h. The seating of projectiles and functioning of the extractors were entirely satisfactory. This breech mechanism is believed to function universally without stoppage except in the case of improperly sized shell cases or battered bases which cannot be charged against the breech mechanism. In one respect a modification of the extractors seems warranted. Where the lips of the extractors bear against the base of the cartridge case, they bear with such pressure that the base becomes indented. In firing service ammunition this fact has no particular significance, but in using drill ammunition or subcaliber ammunition repeated loadings soon cause the flange of the base to become so battered and deformed that the breech will not close and seat the projectile or fire the subcaliber cartridge. It would be very desirable, therefore, if the pressure on the cartridge case by the extractors could be reduced for drill purposes. This could be cared by for by the design of a separate extractor for drill ammunition if the pressure now obtained is necessary to the efficient operation of the breech block when firing service ammunition.

The Board submitted recommendations based on the above conclusions with a view to correcting and remedying all defects noted.

Project No. 177, Sound Ranging Installation (Switchboard).—The greater part of this apparatus has been furnished to Sound Ranging Company No. 1 at Fort Eustis, Va., and the personnel is being trained in its use. The complete apparatus will not be installed for several months. When the installation is complete the Coast Artillery Board will conduct a service test in conjunction with the Sound Ranging Company.

Development tests made under the supervision of the Signal Corps during the past month have been witnessed by the Board. The work is proceeding very satisfactorily and it is expected that the new apparatus, which has been designed by the Signal Corps in conjunction with the Sound Ranging Company and the Western Electric Company, will be a great improvement on the old apparatus.

Project No. 182, Caissons for Mobile Antiaircraft Artillery.—1. Antiaircraft artillery is motorized and made mobile in order that antiaircraft protection may accompany the combat forces of the army in the field. In an advance or retreat the need for such protection probably will be at a maximum and only by great mobility of guns can the protective zone be moved to prevent the infantry from passing beyond it.

2. On a march in the face of the enemy or within range of his air service, antiaircraft protection must accompany the marching columns.

3. Antiaircraft artillery should be in a position to take immediate action while on the road either for its own protection or as offensive action against hostile aircraft if the situation so requires.

4. The mobility of antiaircraft artillery loses much of its value without the concurrent ability for immediate entry into action. There are two principal deterrent factors to immediate entry into action of which one will be solved by the perfection of a self-contained or short base altimeter toward which efforts are now being directed. The other factor is one of the supply and immediate availability of ammunition.

5. Table 128-W—Battery (gun) antiaircraft artillery, gives an allowance of six (6) trucks, cargo, F.W.D., of which five (5) are for rations, baggage and personnel and one (1) for wire and reels. Apparently it is not the intention that any ammunition will be carried by the battery. This will prevent immediate entry into action.

6. Section IV, Table IV-G, Circular 26, War Department, 1922, authorizes three hundred (300) rounds of ammunition per gun, all, presumably, to be carried by the Combat Train. This ammunition, while sufficient for immediate probable needs, is not immediately available.

7. The question could be solved by splitting the combat train so as to have one (1) ammunition truck, (125 rounds 3-inch), accompany each gun, or an additional F.W.D. truck per gun with 125 rounds of ammunition could be assigned each gun battery. The ammunition would thus be boxed and not ready for immediate use. These are believed to be emergency solutions only and not satisfactory as a permanent policy.

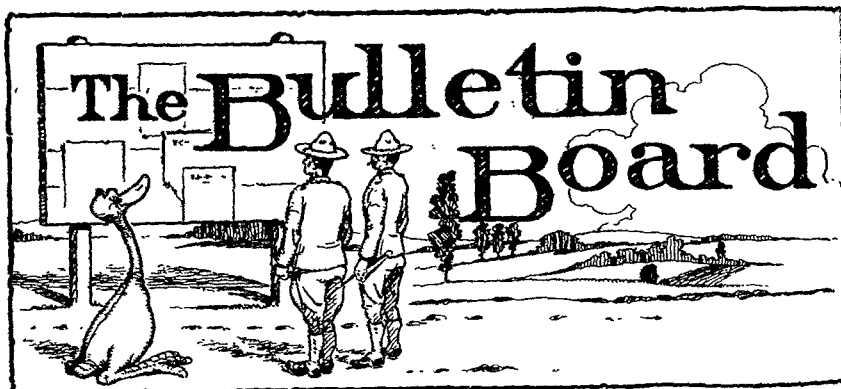
RECOMMENDATIONS:

1. It is recommended therefore that the Ordnance Department be requested to design an armored motor caisson for antiaircraft artillery with a capacity not less than 125 rounds of fixed 3-inch ammunition.

2. It is recommended that a standard type caisson truck and body be designed for all types of antiaircraft ammunition and that the ammunition racks be built in the form of removable sections. This is of value in case of damage to the containing vehicle.

3. It is recommended that these caissons be included in the Tables of Allowances and Tables of Organization for motorized antiaircraft artillery batteries in the ratio of one (1) per gun. The allowance of ammunition to be carried therein should be in addition to that carried by the combat train.

Project No. 165, Communication System for The Island of Oahu.—A study of the system proposed has been completed by the Board and report has been forwarded. The confidential nature of the subject prevents its publication here.



Battery "A," 61st Artillery Battalion (Antiaircraft) Visits Reading, Pennsylvania

By Captain B. T. Ippock, C.A.C.

In the latter part of August, this year, the Commanding General, 3d Coast Artillery District, received a request from the committee in charge of the celebration of the 175th Anniversary of the founding of Reading, Pennsylvania, to permit Battery "A" (the searchlight battery) of the 61st Artillery Battalion to visit that city during the week of October 1, 1923, in order to carry out an illumination program as a part of the festivity pertaining to that celebration. A prominent member of this committee was Captain Joseph D. Eisenbrown, who commands Battery "A" of the 213th Regiment (Antiaircraft) which is stationed in Reading. This Battery, along with the rest of the 213th Regiment, had spent its summer encampment period at Fort Monroe. They had operated the searchlights pertaining to Battery "A," of the 61st Artillery Battalion, and realized the possibilities in employing them as an agency in making the Anniversary celebration a success.

In compliance with this request, a convoy consisting of six Cadillac searchlight units was formed and a schedule made up which called for the completion of the 412 mile journey to Reading, Pennsylvania at the end of the second day out from Fort Monroe. The following gives some idea of the mobility of a searchlight battery equipped with the Cadillac searchlight unit: The convoy left Fort Monroe, Virginia at 6:10 a.m., September 29, 1923, and after losing one hour crossing the York River ferry at Yorktown, Virginia, and two hours for tire trouble along the way, reached Washington, D. C. which is 208 miles by road from Fort Monroe, at 8:00 p.m. the same day. This part of the journey was over dirt roads and all units completed the day's run in good shape. The time required in crossing the York River was abnormally great for the reason that the ferry was so small that it could carry only two Cadillacs at one time. The excessive time lost from tire repair was due to the poor quality of inner tubes furnished. These were evidently

from "war stock," and though they had never been used there were fifteen blow-outs during the 208 miles. The members of the battery were quartered overnight in the barracks of the Headquarters Detachment, District of Washington.

The convoy left Washington, at 11:00 a.m. the next morning on the final lap of the journey for Reading, passing through Gettysburg, Harrisburg and Lebanon, Pennsylvania. At the latter place the officers and men of the battery were entertained by Major Harry C. Barnhart, Commander of the 2nd Battalion of the 213th Regiment, Antiaircraft, Pennsylvania National Guard, and the members of the National Guard units of that city.



FIG. 1. READY FOR THE START

A few miles from Reading on the William Penn highway the convoy was met by Lieutenants E. C. Beck and James W. Smeck of Battery A, 213th Regiment, Antiaircraft, Pennsylvania National Guard, who acted as escort for the remainder of the trip. Upon arriving at the armory in Reading, the officers and men of the Fort Monroe contingent were met by Captain Joseph D. Eisenbrown and members of Battery A, 213th Regiment, who had prepared quarters and mess for the visiting personnel.

On the afternoon of October 2nd Battery A, 61st Battalion, participated in a civic and military parade which was one of the features of Reading's 175th Anniversary celebration. During the remainder of the week the searchlights were operated each night on Penn Mountain in the suburbs of the city as a part of the illumination program. The searchlight exhibition was viewed each evening by fifty thousand visitors who were helping Reading celebrate its founding and enjoying the city's hospitality. A very interesting point in this connection is that the searchlight beams were seen by some officers of the 213th Regiment from a point near Allentown and at a distance of about forty miles from the searchlights. The beams were plainly visible and the number of lights could be counted.

On the return trip the battery left Reading on October 6th, passing through York, Pennsylvania, Baltimore, and Washington, D. C., arriving at Fort Monroe on October 8th after spending one day and two nights in Washington. During the entire trip of 802 miles the average rate of travelling accomplished by the

Cadillac units was approximately 21 miles per hour which is a fair degree of mobility for a military convoy. The dirt roads over half the journey held up the rate of travelling to some extent.

The officers and men of the regular outfit were royally entertained during their stay in Reading, and they will always remember the fine hospitality shown

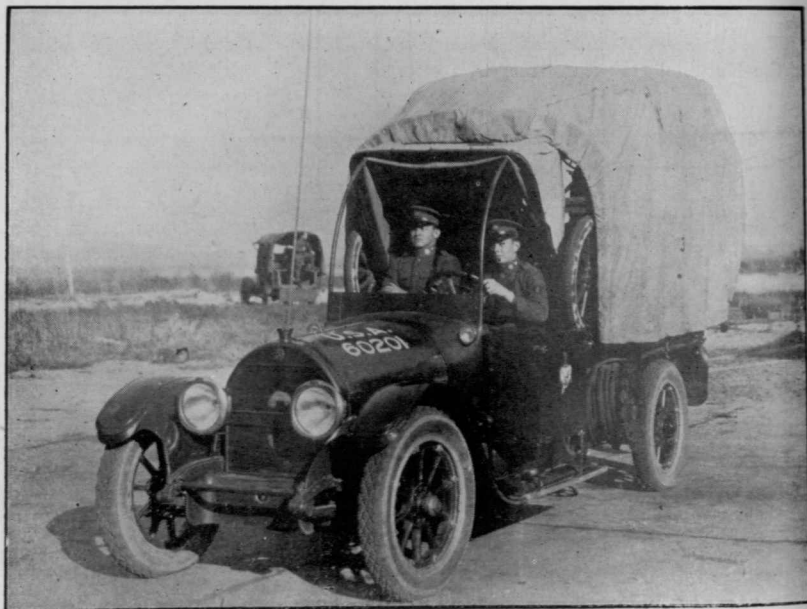


FIG. 2. CADILLAC SEARCHLIGHT UNIT

by officers of the 213th Regiment and enlisted men of Battery "A," 213th Regiment. The friendly relation between the Regular and National Guard organizations, already formed during the summer encampment, has been greatly promoted by this visit to Reading, and the members of the Regular organization are already looking forward with great interest to the visit of the National Guard organization at Fort Monroe for the next summer encampment period.



Coat of Arms for Coast Defenses of Boston

The distinctive insignia for the Coast Defenses of Boston have been received at the Post Exchange, Fort Banks, Mass. This is an attractive device, consisting of a gold shield with red enamel. Upon the shield is enameled a ship (a correct representation of the original Mayflower) in black with sails in white. These are authorized to be worn as part of the uniform by officers and soldiers pertaining to the Coast Defenses of Boston. Officers and soldiers of the Reserves or National Guard of Massachusetts who pertain to the Coast Defenses of Boston may purchase the above mentioned insignia by mail from the Post Exchange, Fort Banks, Mass., price \$1.20 per pair by mail, screw back or safety catch.

The Cruise of the 60th

By Capt. B. Bowering, C.A.C.

The changing of station of an organization in the Army is not an unusual thing but when it involves a trip half way around the world, covering a period of time of nearly three months, the event commands more than the ordinary amount of interest.

The 60th Artillery Battalion, C.A.C., (antiaircraft) was only five and one-half months old when on April 8, 1923, it embarked from its station at Fort Crockett, Texas, on the army transport "St. Mihiel" for duty in the Philippines. On the way up the Atlantic Coast to New York, a two day stop was made at New Orleans which gave everyone a chance for sight seeing, and on April 17th the transport docked at the Army Base, Brooklyn.

The Battalion spent ten days at Fort Slocum and on April 27th embarked on the "U.S. Grant" which was also taking Secretary of War John W. Weeks and a Congressional Party on an inspection of coast defenses in the Canal Zone and on the West Coast.

Five days out from New York, we touched at San Juan, Porto Rico. A whole day was given to seeing the town and on the following day most of the Congressional Party and many of the officers and their families motored across the island to Ponce where they were picked up by the "Grant" which made the trip around the island. That same night we left for Panama and arrived at Cristobal on the morning of May 7th.

Only a few hours were spent on the Atlantic side of the canal. Mr. Weeks and the majority of his party traveled across the Isthmus by train, while the "Grant" proceeded through the canal and tied up the same afternoon at Balboa where a stop of four days was made. This gave everyone a chance to see all there was of Panama City and the surrounding country and many parties and dances were in order.

The trip up the Pacific Coast was made without incident and San Diego was reached on the morning of May 19th where a great reception was accorded the Secretary of War and his party. Two days were spent at San Diego and the consensus of opinion of all who were not "dyed in the wool Californians" was that California really had something to brag about.

Next stop Los Angeles, and two days more of sight seeing while the Congressional Party was being entertained. The feature of this stop was a trip through Hollywood, the Secretary very thoughtfully including all officers and their families on board, in the trip through the land of the movies. The Lasky, Fox, and Fairbanks studios were visited as well as Universal City, and the acquaintance of many motion picture celebrities was made, not the least of whom were "Mary and Doug."

Upon arrival at San Francisco on May 24th, the Battalion was marched to Fort Winfield Scott where it sojourned for five days, during which time we were royally entertained by our fellow Coast Artillerymen. Here, our commanding officer, Major J. T. H. O'Rear, C.A.C., joined the command and on May 29th we steamed out of the Golden Gate on the old "Thomas" with a full quota of officers and enlisted men on board.

A two day stop was made at Honolulu, giving everyone plenty of time to visit the various points of interest in and around the "Paradise of the Pacific."

However, by this time all who had started their cruise from either Galveston or New York were pretty well fed up on scenery of any kind, so there were only sighs of relief when the "Thomas" backed out from her pier to the strains of "Aloha," played by an Hawaiian band.

The seventeen days to Guam seemed like ages and there were few regrets when the bulletin board announced that, because of the numerous cases of measles among the one hundred and two children aboard, no one would be allowed to go ashore.

After six more days, land was again sighted, and in spite of the many rumors of typhoons, the "Thomas" nosed her way through San Bernardino Strait, up past Corregidor, and finally into the breakwater at Manila without encountering even the smallest "blow."

Three days out from Manila we had been informed by radio that our station would be Fort McKinley, on the mainland, and not Corregidor, the Mecca of all Coast Artillerymen in the Philippines. Nevertheless, all were at least thankful that the long trip back to Fort Mills was being spared us and that the journey by water was ended. As a matter of fact, we were a little premature in our reckoning, for on the opposite side of the pier where we docked, barges were drawn up, upon which the Battalion was loaded; and then commenced a four hour trip up the muddy waters of the narrow, winding Pasig to the Fort McKinley dock. Four hours, and the distance covered seven miles!

But this was really the end. The 60th was soon settled in barracks on the big reservation and it is a safe bet that no member of the Command will care about going to sea again for many a day. During the period of the journey from April 8th to June 24th, a total of 15000 miles had been covered with stopovers at eleven different points.

On October the 26th we celebrated "Organization Day," our first anniversary: and while the 60th is one of the youngest organizations in the Army, it is predicted that it will not be long before it will be heard from professionally.



38th Company C. A. C. in Algiers

The COAST ARTILLERY JOURNAL is indebted to Colonel Oliver L. Spaulding, Jr., Field Artillery, for the following brief account of the services of the 38th Company, C.A.C. (then known as Captain S. B. Archer's Company) with the Mediterranean expedition in 1815. It is believed that this is the only unit of the United States Army that took part in this war, which heretofore has been regarded as a purely naval affair.

By Colonel Oliver L. Spaulding, F.A.

Captain Archer was notified by letter from The Adjutant General March 30, 1815, to report to the Secretary of Navy to receive instructions relative to the future service of his company of artillery. Under these instructions Captain Archer proceeded to New York and reported his company to Commodore Stephen Decatur for service with his squadron then being fitted out for service against the Regency of Algiers.

On May 20, 1815 the squadron, consisting of the 44 gun frigate *Guerriere*, 38 gun frigate *Macedonian*, 36 gun frigate *Constellation* and 7 smaller vessels, set sail from New York for the Mediterranean. Captain Archer's Company of Artillery was split up in detachments for service on different vessels, of the squadron.

Forty-six officers and men served on U.S.S. *Guerriere*, the flagship of Commodore Decatur.

June 17, 1815, when in the Mediterranean off the Cape de Gat the squadron fell in with and captured an Algerine frigate of 46 guns and between four and five hundred men, commanded by an Algerine admiral. She struck after a running fight of twenty-five minutes, and after receiving two broadsides from the *Guerriere* which killed the admiral and about 30 of the crew. The prize was sent to Carthagen. Continuing on the squadron on the 19th of June fell in with and captured off Cape Polos an Algerine brig of 22 guns and 180 men, after a chase of three hours. After putting the greater part of the prisoners on board the captured brig, she was also sent into Carthagen. The squadron then made sail for Algiers where it arrived on the 28th of June. Here under the threat of the guns of the squadron the Dey of Algiers signed a treaty putting an end to the payment of tribute by American shipping.

From Algiers the squadron proceeded to Tunis and Tripoli, where difficulties of a minor nature were adjusted, after which the squadron sailed for home arriving in New York in November, 1815. Here the company was reorganized and outfitted in preparation to being transferred to Ft. Bowyer (Mobile Point).



Coast Artillery Corps, R. I. N. G. Becomes 243rd Artillery, R. I. N. G.

Through general orders issued by Governor Flynn and the office of Adjutant General Abbot the general status of the Coast Artillery National Guard Units of this state has been radically changed. By authority of the Militia Bureau, War Department, the Coast Artillery organization of the Rhode Island National Guard is now known as the 243rd Artillery, Coast Artillery Corps, Rhode Island National Guard.

The changes in the designation of the various units of the 243rd Artillery are as follows: Headquarters Detachment to Headquarters Battery; 345th Company to Battery A; 346th Company to Battery B; 347th Company to Battery C; 348th Company to Battery D; 349th Company to Battery E; 350th Company to Battery F; 351st Company to Battery G; 352nd Company to Battery H.

A most pleasing feature of this new arrangement of the organization is that it permits the formation of a new unit at Newport, R. I. to be known as Battery I of the 243rd Artillery. This battery of course to be subject to the approval of the War Department and to be assigned to duty there with quarters at the former Naval Battalion Armory. With this new unit the organization will consist of nine full batteries and one Headquarters Battery which will permit the formation of three battalions or fort commands and necessarily more field and staff officers. This is a most welcome addition to the Coast Artillery organization of Rhode Island for more reasons than one. In the first place the formation of a battery at Newport finally covers a portion of the state that heretofore has been untouched by our National Guard organizations. It seems to have been always considered as the undisputed territory of the Naval organization. It is most natural to assume, however, that there are nearly as many promising candidates for army units in the vicinity of Newport as any other city of the state. The large number of towns in the vicinity of Newport should be able to contribute a goodly supply of re-

cruiting material to help the formation of the organization. Such localities as Jamestown, Middletown and Portsmouth should be able to aid materially in this matter. A most convincing argument for enlistment at Newport is the close proximity of such an organization to the various fortifications of Narragansett Bay. Opportunity for practical drill at Fort Adams with the "real equipment" should be real incentive for enlistment in the Newport Battery.

With three full fledged battalions at camp next summer the Rhode Island Coast Artillery National Guard should present a most enviable organization.

With the new table of organization of our Coast Artillery it is most natural to revive the hopes of the members in really obtaining the equipment for tractor drawn or railroad mounted artillery. This has been looked forward to for a long time because the need is felt for a type of artillery more attractive to prospective recruits than the rather out-of-date and passive style that they have been using. Out of doors drill on some real artillery with a little noise attached should fill the rosters to overflowing in a very few weeks.

The officers of the various companies are assigned the Batteries of the new organization as changed. All Staff and Headquarters Officers are re-assigned.—*The Tank—Official Paper, R. I. N. G.*



Reserve Officers of 1st Coast Artillery District in Camp at Fort H. G. Wright

By One of Them

Leaving Boston on the 5th of August, we proceeded via that hot dusty iron trail to New London, Conn., and after a delightful sail from there on the Government boat to that cool and breezy place known as Fort H. G. Wright, Fishers Island, N. Y., and arrived there just in time to wash up and have "CHOW." Already there were a number of officers who had arrived the day before and some that morning—all anxious to get down to work.

Promptly at six o'clock that morning first call sounded and the rush for the lavatory commenced with a scramble for places to wash and clean up but this condition did not seem to exist on any other morning throughout the whole tour.

First honors for early rising must be handed to Major Buker whose official title conferred upon him unanimous consent as "CHIEF PRYOR UP OF THE SUN." The one for late retiring is still in doubt as two or three who bear the official title of Lieutenant battled up to the last minute for the honor but owing to the fact that all did not sound off with the cuspidors on retiring it was rather difficult to keep track of this contest.

The work of the day began at six-thirty with physical drill, or, as aptly put by one member frog exercises and after the first day or two most of us discovered muscles that had long since been forgotten or were out of service, thereby causing loud groans and creaking from the affected parts. On several mornings we had contests and group games between the various groups into which the officers were divided for instruction. The Connecticut beef trust challenged the Massachusetts men to a tug of war and were roundly beaten, being pulled off their feet by the Massachusetts team.

The next thing on the program was mess and, strange to relate, there were never any stragglers for this event. All during the camp the mess was most excellent and was handled in first class shape by Captain Herbert A. G. Bultman and his cheery assistant Captain A. C. Bennett the "Admiral of the Fleet."

After mess the different groups assembled in front of quarters and then reported at the appointed place of instruction not later than eight o'clock—before doing so however, they must have finished their housekeeping and made up the cots.

The work of the camp was very instructive, and too much praise cannot be given to the Regular officers assigned as instructors for the clear and intelligent manner in which they presented their different subjects and a better group of men would be hard to duplicate.

To the Commanding Officer, Coast Defenses of Long Island Sound, and officers who are permanently stationed at the post we take off our hats for the kindly manner in which we were received and treated during our stay at Fort Wright.

On Monday, the sixth, all officers and enlisted men assembled on the parade ground in front of the flag staff for a sad but impressive ceremony for our late beloved Commander-in-Chief and President—Warren G. Harding, and listened to a short address by our District Commander, General Hersey, whose visits to our midst were always a pleasure to us.

The scope of the work during the tour was very broad taking in most all the different phases of artillery. Right here let us say we regret the fact that the time was so short that only the high spots could be touched, although it must have freshened each subject in every one's mind and things it seemed as though we had forgotten came back as clearly as if it were only yesterday that we had stepped out.

Some of the work could no doubt have been improved upon very much if it were possible to have had sufficient trained enlisted personnel at the post, but we realized that this condition is not the fault of those in charge of the work but the direct result of the conditions forced upon them by others by their so-called program of economy and which we, as members of the Organized Reserve, should strive to overcome.

With the help of the C.M.T.C. boys it became possible for all officers who wished to do so to actually conduct the firing of a battery and some pretty shooting resulted. Two targets were actually put out of commission during the firing. Weather conditions during the practice and in fact during the whole tour were ideal. The firing was not limited to the large guns as all had an opportunity to fire machine guns, automatic rifles and pistols. The practice with the 155-mm. guns was very spectacular with the H.E. shells. Many officers also shot the regulation pistol course under the instruction of Major Atwood.

A pistol competition was held between the Coast Defenses of Narragansett Bay and the Coast Defenses of Boston, which was won by Narragansett, although we afterwards learned that they were no novices in competitive shoots so no wonder they ran away with the honors. We should advise them to watch out for their laurels in the future.

The Field officers had a very interesting course in tactics under Major Eddy, particularly as to the use of heavy artillery in conjunction with the other branches of the service and all felt that this will be enlarged upon and made a special course for this group of officers.

Owing to the lack of enlisted personnel the infantry work was performed by the Reserve Officers in conjunction with the C.M.T.C. units and a large portion of these young men were enlisted in the Organized Reserve.

One afternoon a gas and smoke attack was held on the parade ground and the new masks were tried out. There were some who removed their masks too soon, much to their regret, causing heavy weeping for some time after they returned.

A smoker was tendered to the Reserve, National Guard and officers on duty with the C.M.T.C. by the regular officers stationed at the post, and was returned by the Reserve Officers one evening at which the song birds of the Reserve Officers entertained in a manner which did credit to themselves.

A baseball game between the C.M.T.C. boys and the Reserve Officers was played and the old boys showed the youngsters something about the game, beating them by a good score with Lieut. Roy pitcher, Lieut. Allen catcher, and Lieut. Colonel Alden first base.

The entire tour passed without one unpleasant circumstance and every one made a vow that if it were at all possible to do so, they would surely come to the next camp and with deep regrets on the part of each and every officer, the last goodbyes were said at the dock on Sunday morning, August 19th, as they departed to their homes.—*The Hit Bag*.



The Bok Peace Award

The competition for the American Peace Award, created by Edward W. Bok, and offering \$100,000 for the "best practicable plan by which the United States may cooperate with other nations to achieve and preserve the peace of the world," closed on November 15th at midnight. 22,165 plans were received.

The Jury of Award, consisting of Elihu Root, chairman; General James Guthrie Harbord, Colonel Edward M. House, Ellen F. Pendleton, Roscoe Pound, William Allen White, and Brand Whitlock, has been at work on the plans since the middle of October, and is expected to have made its choice by January first. The Policy Committee which has been administering the Award now announces that during January it will present the winning plan to the American people for their consideration and vote.

This "referendum" will be conducted:

1. Through the daily and weekly press.
2. Through the Cooperating Council of the American Peace Award.
3. Through Mayors' committees in many communities.
4. Through the universities and libraries of the country.
5. Through local organizations of all kinds.

Organizations whose combined memberships total many millions have already agreed to submit a copy of the winning plan and a ballot to their members.

The press of the country covering both the dailies and weeklies is generally cooperating with this attempt to secure from the American people a wide expression of opinion on this vastly important subject. Many papers, which have a consistent policy of not carrying ballots of any kind have made the first exception in their history in this instance.

With so many agencies of such a wide variety cooperating, the committee feels that the "referendum" should be most effective. However, it emphasizes the need of security, not a great volume of ballots representing the hasty, unconsidered action of the voters, but the real opinion of the voters after they have carefully read the plan, or a luminous digest of it.

PROFESSIONAL NOTES

Accident at Battery Dutton, Fort H. G. Wright, New York, August 1, 1923

On August 1, 1923, No. 3 Gun, *Battery Dutton*, Model 1897-MI on 6" D.C. Model 1898, was fired while in the loading position. The Battery was manned at the time by a visiting National Guard Organization. The accident is in no way a reflection upon the training, conduct, or supervision of this company.

The Company was engaged in its annual service practice. Only one previous shot had been fired. Testimony of all available witnesses before the investigating Board of Officers established the following facts:

- a. That the company was satisfactorily trained.
- b. That the individuals had been trained to and were competent in their positions.
- c. That Regular Army personnel was present to exercise safety supervision.
- d. That all preliminary inspections had been made and safety precautions taken.
- e. That Chief of Breech (No. 3) had over two years experience at this position.
- f. That simple friction primers were used.
- g. That powder chamber had been thoroughly sponged and inspected after first shot.

An inspection immediately after the accident disclosed:

- a. That primer was fired.
- b. That lanyard was properly hooked.
- c. That short lanyard was properly coiled and in place.
- d. That the lanyard safety device was properly set.

SUMMARY OF EVIDENCE

The testimony received as sworn oral statements, affidavits or certificates is summarized by the Board as follows: Shortly after 5:00 P.M. the first shot of the series from this gun was fired. The Company Commander inspected the firing mechanism before the firing began and everything appeared to be in working order except the electric firing circuit which was out of order and friction primers were therefore used. When the lanyard was first pulled for the first shot, the primer failed to function. The *Chief of Breech* was told to try to fire again by exerting more of a pull on the lanyard. This was done and the gun was fired. The piece was then loaded and the breech block properly closed. The lanyard was hooked and *Number 3* inserted a primer. The primer button did not seat properly in the notch in the firing leaf when the firing mechanism slide was pushed downward over the primer button wire. The button wire was bent downward by

this movement. This primer was then withdrawn and another primer inserted. As the firing mechanism slide was being lowered on this second primer and while the piece was still in the loading position the gun fired. The gun leaped backward, out of the trunnion bearings, slid backward through the elevating band about twelve inches and dropped so that the breech block hinge rested on the concrete loading platform. The rear web in the top carriage was broken. Other minor parts were damaged as shown on the attached list. The projectile ploughed through the concrete emplacement in front of the gun. It is estimated that the total damage will amount to about thirty-five hundred dollars (\$3500.00), not including labor, as most of the labor can be performed by the garrison. No persons were injured except for minor cuts and bruises. The short lanyard was found to be

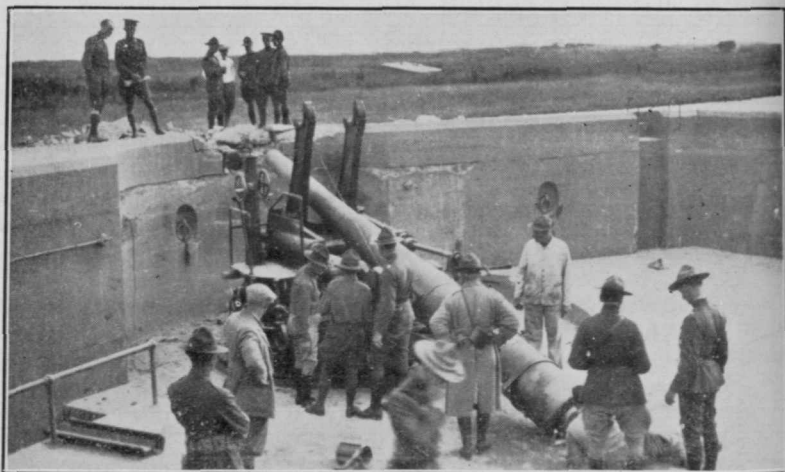


FIG. 1

hooked, properly coiled, and in place after the accident. The firing mechanism and primer were removed from the gun for safekeeping and were later turned over to the Board. The gun and emplacement were at once placed under guard and were not disturbed until after the Board completed its investigation."

PHYSICAL EXAMINATION BY THE BOARD

The Board carefully examined the firing mechanism and primer used on this gun when the accident occurred. This firing mechanism was used by the Board to fire ten primers and in all cases except one the primer wire failed to seat properly in the notch of the firing leaf. However, none of the primers exploded through the lowering of the slide, even though the slide was driven downward by a sharp blow of the closed hand. In general, the primer button caught in the inverted V-shaped entrance to the notch of the firing leaf and as the leaf was lowered the primer wire bent downward and the primer button was tipped backward.

Each of these primers was fired by lanyard and each of the fired primer buttons clearly showed the marks of the jaws of the firing leaf notch on the forward face of the primer button. This condition was found to exist whether a quick, sharp jerk or a gradual increasing pull was applied to the lanyard. The Board failed to find any such marks on the button used at the time of the accident but did find the primer wire bent downward and the button part of the wire tipped backward similarly to the primers tested by the Board.

FINDINGS

1. The Board finds that the premature firing of Tactical No. 3 Gun, *Battery Dutton, Fort H. G. Wright, N. Y.*, on August 1, 1923, while the gun was still in the loading position, was due to the use of a faulty firing mechanism, the defect in the firing mechanism being one of lack of alignment in the notch of the firing leaf with a like notch on the slide. These two notches unite to form one continuous notch and should be in perfect alignment. They are out of alignment in the faulty mechanism by .030 inches.

2. The premature firing, in the opinion of the Board, based on the evidence and the experiments conducted by the Board, was occasioned in the following manner:

a. That when the slide was lowered the primer wire did not properly enter and seat itself in the notch, but bound in the notch due to the section of the notch in the firing leaf being out of alignment with that part of the notch in the slide.

b. That the lowering of the slide, as the wire was binding in the notch, bent the wire downward and the operation stopped with only the upper portion of primer button engaged at the entrance to the notch of the leaf and with the button resting more to one side of the entrance than the other. This operation also resulted in the tipping backward of the primer button, the tipping of the button being due to the face of the firing leaf engaging under the upper portion of the button only.

c. That the downward movement of the slide with the primer wire binding in the notch, necessarily resulted in an appreciable movement of the primer wire to the rear through the primer body itself.

d. That the slight movement of the primer wire to the rear through the primer body set off the primer. In order to draw this conclusion the Board is compelled to accept almost as a fact, that the primer which prematurely fired was itself, also, defective in being supersensitive, as all primers experimented upon by the Board failed to explode until subjected to the usual lanyard pull.

3. The Board does not believe that the premature firing was the result of a lanyard pull. The safety lanyard was found in proper position after the accident; and the primer button showed no marks of the jaws of the firing leaf notch as would be expected with the primer wire bent downward to the extent of the primer under discussion.

4. The Board does not believe the premature firing of the piece was due to ignition of the powder charge by particles of burning residue from the previous shot. The chamber and bore were swabbed out after the first shot as required by regulations. The piece was not loaded for the second shot for three minutes after the first shot had been fired. Besides the chamber and bore were examined closely by Corporal Sullivan, a Regular Army Gun Commander, present at the firing and who removed the pressure plug after each shot from this gun. Corporal Sullivan observed no smoldering residue in the chamber when he removed the pressure plug.

5. The Board further finds that the usual examination of the firing mechanism was made by the Battery Commander just prior to the firing and is of the opinion that the lack of perfect alignment between the notch of the firing leaf and the notch in the slide would not be noticed by the Battery Commander at his inspection.

6. The Board believes that only expert inspection would discover the defect of precise alignment in the two notches and then only after a close examination of the alignment. As such expert examination is not required prior to every oc-

casion a firing mechanism is used, the Board believes itself justified in finding that the premature firing of the gun through the employment of a defective firing mechanism was without fault or neglect on the part of anyone but was incidental to the service.

EXTRACT FROM FIRE COMMANDERS DEPOSITION

"While Number 3 was still in the standing position of inserting the primer I distinctly heard the command "In Bat——." At that particular point a severe explosion occurred and the gun emplacement was completely enveloped in smoke and debris. After hailing a lieutenant on the ground just a little behind the battery and directing him to immediately summon our entire hospital corps to report



FIG. 2

to *Battery Dutton* at once, I went to the emplacement and found the personnel were forming section and calling off, upon completion of which it was found the entire personnel was present and outside a few minor cuts and some bruises no one was hurt. Words cannot express the splendid deportment and discipline of the men which prevailed throughout."

REMARKS

The escape without serious injury to anyone is considered miraculous. Had either *Numbers 1, 2, or 3*, deviated from their prescribed positions at either side of the breech, they would surely have been killed or maimed when the gun jumped backward. Concrete particles up to two and three pound hunks were scattered for fifty yards. The trunnion cap square studs were sheared and the cap squares (thirty pounds each) were hurled to the rear about eight feet.

The mal-alignment of the firing mechanism is believed to be a fault common to the wrong assembly of the firing mechanism. Frequently, the safety bar is inserted wrongly by inexperienced or careless operators. When closing the breech with this assembly, the safety bar is jammed against the leaf, forcing it to the left and out of alignment. Another consequence of wrong assembly is a broken safety bar.

The French Long-Range Gun

Recent press dispatches from Paris state that the French 60-mile gun has recently been sent from the Ruelle Arsenal to the Gavres Proving Ground for test. This is France's largest and most powerful gun. It is understood that the weapon has a range of 97 kilometers (sixty and a half miles). The projectile is said to weigh about 1,100 pounds.

This gun was originally constructed during the World War in retaliation to the German long-range gun which shelled Paris and which is described in full in Colonel Miller's article in this issue of Army Ordnance. The French gun was not put into use during the war, however, because it was found that the railroad viaducts out of the arsenal at Ruelle were not strong enough to permit its transport. The road and bridges have been reinforced since the war and the great gun is now under test.—*Army Ordnance*, Nov.-Dec., 1923.

New Flashless Powder Developed

The Army Ordnance Department has developed a powder that is flashless, smokeless and non-hygroscopic. The new powder may be exposed indefinitely to any atmosphere saturated with moisture without effect on its properties. During tests it has been completely submerged in water without any absorbed moisture being found.

The present type of service powder, because of its tendency to absorb moisture, must be packed in waterproof containers. If these containers are in any way defective, deterioration is almost certain to result.

The new type of powder was first developed for the 75-mm. gun and has now been modified to include charges for heavier artillery. It will also be adapted to small arms, such as the rifle and machine gun, and will eventually replace entirely for all arms the type of powder now in use.—*Chemical Warfare*, October, 1923.

'Round the World

Jules Verne described a journey round the world in eighty days. His efficient hero took the fastest steamers and trains, never missed a connection. Airmen may cut this time to thirty days. The United States, England, France, Portugal are all in friendly rivalry to achieve the first flight 'round the world. The English pilot, Sir Keith Smith, has already flown from England to Australia. The Portuguese have great confidence in Admiral Gago Continho, and Captain Sacadura Cabral, who flew last year from Lisbon to Rio de Janeiro. In the United States, Major General Mason M. Patrick, Chief of the Army Air Service, who is fostering the American plans, will select men who have not yet been in the limelight, though thoroughly qualified and experienced men—to "give every one a chance," as is the Air Service policy.

The United States expedition will include from four to six planes. The planes must have a gasoline capacity of 1500 miles. They are now being selected by Lieut. Erik H. Nelson, who was Engineer Officer on the recent Alaskan and Porto Rican flights. Two points are certain. They will be equipped with Liberty motors (still the most reliable aero engine built) and will be of American design. The joy of victory in Macready and Kelly's transcontinental flight was sadly marred by the thought that they flew in a Fokker plane.

The airmen will fly facing the sun. Testing their craft by a long flight across the continent from Seattle to the Atlantic coast, they will fly to Europe, probably by way of Greenland or Iceland, then through Central and Southern Europe, Asia

Minor, Arabia, India, China, Japan; and home by way of Alaska. This itinerary will cover 27,000 miles, non-recognition of the Soviet Government precluding the much shorter route through Siberia.

The aviators will face every type of climate, all possible difficulties in navigation, a doubtful welcome in many strange lands amidst strange and semi-civilized peoples. Yet good hopes of success are entertained.—*Time*, Dec. 3, 1923.

Extract from Annual Report of Secretary of War

During the past ten years, while the cost of national defense has been doubled, the Regular Army has increased its actual total strength from 92,035 to 132,834, the National Guard from 120,802 to 160,598, the Organized Reserves from zero to 78,338, and the total of the Army of the United States from 212,837 to 371,770. This increase alone, considered in relation to the decrease in value of the dollar and the change in character of the Army (including addition of such elements as motor transportation, tanks, aviation and chemical warfare service), would apparently justify a doubling of the total defense cost. In the same period, moreover, the number of citizens under training, not as members of the Army of the United States, has increased as follows: In the citizens' military training camps from zero to 31,000, and in the Reserve Officers' Training Corps (which corresponds to the unorganized military schools of the pre-war period) from 31,028 to 101,129. The total of individuals under training has thus increased from 243,865 to 504,010. This increase would be too much to expect were it not that the training is very incomplete in some cases, and that we are at present augmenting our expenditures by the employment of war stocks of supplies which could not profitably be sold and which would not normally be available for consumption.

A War Invention

For some time past rumors have been current in Europe of a mysterious invention by means of which automobiles and even airplanes can, from a distance, be brought to a standstill. The recent forced descents, said to be eight in number, of airplanes of the Franco-Roumanian airplane line, flying over German territory, were declared to be in no way due, as at first supposed, to ordinary motor trouble, but were really the result of the exercising of a mysterious controlling force, operated from the ground.

Such reports were so extraordinary that they were received with skepticism. This attitude is, however, no longer possible after an official of the French air ministry has declared that the French government is in touch with successful experiments for the control of automobiles from a distance. The same official denies, however, that there is any proof that the Germans have succeeded in applying the new invention to the stopping of airplanes in flight.

At the same time he did not deny that the new invention might prove capable of extension to airplanes. His denial is consoling as far as it goes, but the fact remains that the eight machines of the Franco-Roumanian air line which were forced to descend, all developed their motor trouble at the same spot in Bavaria.

As was inevitable, the French authorities are already in search of a counter-invention which will protect aircraft and automobiles against the effects of this mysterious power. If this should not be promptly discovered the effect of the arresting power would be revolutionary. All modern armies are forced to depend on motor power, not only for conveying food and munitions, but also for drawing the heavy guns and working the tanks. Without unimpeded motor power, warfare as it is at present practiced would be impossible.—*Washington Post*.